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STORIES
OF WILD FLOWERS
CHILDREN LOVE

CHANDLER



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STORIES OF WILD FLOWERS
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STORIES
OF WILD FLOWERS
CHILDREN LOVE

A SCIENCE READER
for
THE PRIMARY GRADES

BY
KATHERINE CHANDLER

Author of

“Habits of California Plants”

“In the Reign of Coyote: Folklore from the Pacific Coast”

“The Bird-Woman of the Lewis and Clark Expedition”

“As California Wild Flowers Grow”

WITH 25 ILLUSTRATIONS

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no 1

To My Sister

MABEL G. CHANDLER, WHOSE WORK IS PRE-
PARING LITTLE CHILDREN FOR THE DUTIES
AND PLEASURES OF AMERICAN CITIZENSHIP.

PREFACE

The plants chosen for this book have the simplest blossoms, such as can be observed easily by the child from seven years of age on. I have had even younger pupils intelligently interested. No plant has been treated fully, as that would be too difficult for the child. On the other hand, every fact given is scientifically true so that what the children learn in these pages will not need to be corrected when they become mature students, as plants do not change their habits in the brief span of man's life.

In the lessons, the attempt is made by suggestion to connect the Nature Study with the other Primary subjects—drawing, arithmetic, geography and history, as well as with the study of insect life and with the love of the beautiful. The attempt is also made to extend the interest in growing plants to the home life. If our American civilization is to continue, the schools and homes must be more closely affiliated. The connecting link is the child. If we can stimulate it to ask questions at home, to be answered by one of the family, we are drawing a little nearer. The child of the Primary School is in the questioning age. I believe that books should be written with some questions for him to answer instead of being filled entirely with pages of information.

If we get little children interested in the growing things around them, we have given them an inspiring gift for life. We have opened up to them a realm more wonderful than Fairyland. And what are fairies after all? They are but the creations of our fancy, endowed by us with the powers we fain would have ourselves. They are only human beings raised to the superlative. But a *plant*, now that *is* wonderful. A tiny brown seed goes into the ground—sometimes by its own action—and it develops into a beautiful blossom of graceful form and exquisite coloring. We could not *imagine* the marvel of plant growth; yet it is a truth that lies all around us and our eyes need only to be opened to enjoy it.

The photographs were taken by Mr. Antone J. Soares of Hayward, California. No attempt has been made to have a scale of size, as it is desirable to give each flower as full detail as possible. My sister, Miss Mabel G. Chandler, has tried the lessons in the San Francisco Public Schools and has made suggestions regarding thought content and vocabulary.

KATHERINE CHANDLER.

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I

BUTTERCUPS

“Buttercups and Daisies,
Oh! the pretty flowers,
Coming ere the Springtime
To tell of sunny hours.”

MARY HOWITT.

Does your Grandmother sing you that song? My Father sang it to me when I was a tiny girl. He had learned it from his Grandmother. For many years our people have been singing it to their children. They have sung it because they know that the children love these flowers. They are such friendly flowers. They are always willing to tell children what is good for them.

Hold a buttercup under Mary's chin to see “if she likes butter.” See how quickly a bright yellow light shines on her skin. Try it under John's chin. His skin shines with a yellow light too. That means that Mary and John “like butter.” Try it under the chins of your other playmates. I think you will find that they all “like butter.” They ought to, because butter will make them strong and healthy.

Mrs. Buttercup does not make the inside of her cup shiny just to help children find out what they like. No, indeed! She makes it bright so that she can get help in her life work.



FIG. 1.—Buttercup. (*Photographed by A. J. Soares.*)

Her work is to make good seeds. She knows that she can make the best seeds if she can have some insect to help her. She is willing to pay well for help. She wears a pretty dress so as to attract the eye of the helper. She sets out a dish of honey to please its tongue. She makes the honey fragrant to please its nose.

Take a stem of Buttercups in your hand. Look at the open flower. The pretty colored part we call the "corolla" or crown. Each part of the corolla is called a "petal." Count how many petals there are in the Buttercup's shining crown. Are there the same number of petals in the next Buttercup?

Now look at a bud. See the green covering it wears. We call this the "calyx" or cup. It holds the corolla. See how the calyx is covered with fine hairs. Mrs. Buttercup puts them on to keep the baby flowers warm. She is as careful of her babies as your Mother is of your little Brother. Your Mother puts warm clothes on your Baby when he goes out in the cold. Does she not? So Mrs. Buttercup has covered her calyx with soft hairs to keep her bud warm.

When the bud grows larger, the calyx opens into five parts. We call each of these parts of the calyx a "sepal." Is the sepal hairy inside? Does your Mother put fur against your Baby's skin?

See how the sepals curve backward as they open. See how the petals are wrapped closely around each other. You see that the outside of the petal is not shining. It is a pale yellow.

Now look again at your open Buttercup. It shows the inside of the petal. Mrs. Buttercup has varnished the inside of her corolla. When the Buttercups open in a field, the sun shines right into their cups. The varnished inside throws back the sunshine brightly. You know your varnished school desk throws back a brighter light than does the dull floor.

This bright golden light flashes right into the eye of some insect who is searching for food.

"Gold! Gold! Gold!," she chuckles. "That means good food. I will go and get it."

Very soon she alights on a Buttercup.

"Good! Good! Good!," she murmurs contentedly. "What a sweet smell. I must get to that smell."

Look at the Buttercup petal. See all the little fine lines leading down to the center. These are called "honey paths." See where they end.

See that heavy little plate set right on the bottom of the petal. That is full of honey. Sometimes it is so full that it overflows. It is this honey which makes the buttercups smell sweet.

Mrs. Bug lights on the edge of a petal. She finds a "honey path." Down she walks. Soon she is at the edge of the plate of honey, eating fast. Oh, isn't she glad she came? I just wish you could share her party.

Look at your Buttercup again. Inside the corolla, you see standing up many little stems, each with a tiny box on top. These stems we call "stamens." The tiny boxes we call "anthers."

Each anther is full of a golden powder, which is called "pollen."

As Mrs. Bug moves around at the bottom of the petals, sucking out the honey, she touches the stamens with her body. Then the anthers open and let the pollen fall over her. You can try it for yourself. Take a pin and jostle the lower parts of the stamens in a full grown Buttercup. The anthers will open and the pollen will fall out. You can play that you are a little Bug until you see how a buttercup works.

II

BUTTERCUP, AGAIN

“O velvet Bee! you’re a dusty fellow—
You’ve powdered your legs with gold.”

JEAN INGELow.

Has your Mother read you that poem? If she has not, ask her please to do so. I am sure you will like to learn it. It gives you pretty pictures to remember.

And that is just what happened to Mrs. Bug in the Buttercup. Her legs and her body got well powdered with golden pollen.

Mrs. Bug is always very hungry. She can eat more honey than one Buttercup holds. She finds that the Buttercup dish just suits her taste. When she eats all in one flower, she moves to the next Buttercup. Just here is where she helps Mrs. Buttercup in her life work.

Look at your buttercup again. Inside the ring of stamens, see the little hill covered with little green sticks. Each of these is called a “pistil.” When Mrs. Bug goes into the second Buttercup, her body and legs touch the pistil on the way in. Some of the pollen from her body or legs gets onto the pistils. The top of the pistil is called the “stigma.” The stigma takes this pollen and sends it down the inside of the pistil to



FIG. 2.—Marsh Buttercup. (*Photographed by A. J. Soares.*)

a little seed-case. In this seed-case, little seed germs are waiting. We call these seed germs "ovules." The pollen makes these ovules grow into seeds.

Now, that is just what Mrs. Buttercup wants. She colors her corolla a beautiful shining gold to catch the eye of Mrs. Bug. She sets out a dish of fragrant honey to please her nose and tongue. She makes little paths so that Mrs. Bug can find this dish. She puts her stamens where Mrs. Bug must touch them as she eats. Mrs. Buttercup fixes the stamens so that when they are moved the anthers will open and throw out the golden pollen. She makes the pistils so that when the pollen is dusted onto the stigma, it will send it down to the waiting ovules. She makes the ovules start growing into seeds when the pollen falls upon them.

Is it not wonderful?

You did not think that Mrs. Buttercup was such a wonder maker, did you? You just thought of her as a pretty golden flower sitting in the sun until you picked her.

Perhaps you think of your Mother as just your Mother and not as a wonder maker. Think a while about all your Mother does from early morning until late at night. Keeping a home and rearing good children needs much wonderful work.

Mrs. Buttercup thinks her pollen box and her seed-case her most important parts. As soon as the sunshine leaves her, she folds the corolla tightly around them. In this way, she keeps them

warm during the night. She wraps them up when it is cold or wet.

Did you ever look at a Buttercup field when it was raining? Did the corollas stay open? Did the field shine?

After the seed is started, the corolla stays open. Then the sun shines right in on the seed-case and ripens the seeds.

Mrs. Buttercup does not stop her care when she has the seeds started. She wants each seed to get a good place to start a new life of its own. You know your Mother and Father want you to grow up and get started in some useful work. They take care of you while you are too young to take care of yourself. They give you schooling for whatever work you think you are going to like.

Now, Mrs. Buttercup knows that her children are going to like to be Buttercups. She feeds them while they are young. She waits until they are ripe to send them away from home. She makes them grow so that they can help themselves. On each seed, she grows a little hook. When a seed is ripe, it hooks itself to anything passing. Perhaps some hooked themselves to your dress, Dorothy. Or to your stockings, Robert. Then you gave them a free ride. After awhile, they fell off. They buried themselves in the earth. There, the next year they started new Buttercup plants.

If you want a new dish for your play parties, try buttercup seeds. The California Indians used to gather baskets and baskets full of these seeds.

Think how long it took to fill a basket with such tiny seeds. But it was fun. Out in the sunshine, all the women and all the children working together. Perhaps you think they did not laugh and play. Well, you should have been there.

In the Indian camp there was always a fire. They placed a flat rock on top of the fire. When the rock was hot, they poured some buttercup seeds on it and parched them. Sometimes they ate the parched seeds dry. Sometimes they made them into a mush. It tasted somewhat like parched corn mush.

You can gather seeds and plant them to start a California Wild Flower Garden at school. You will have lots of fun watching the plants grow and bloom and the insects coming to see them. Just try it.

Good luck!

III

PARTS OF THE FLOWER

The CALYX is the outside cup.
It holds the flower snugly up.
Its SEPALS have been woven stout
To keep the cold and dampness out.

COROLLA is the colored part
That gladdens every child-like heart.
Its PETALS wave upon the breeze
To summon butterflies and bees.

The STAMENS next within the ring,
Their ANTHERS set on magic spring.
These ANTHERS store a generous meed
Of POLLEN, needed to make SEED.

The PISTILS in the center fare
For they must have the greatest care.
Their STIGMAS catch the POLLEN beads
Which turn the OVULES into SEEDS.

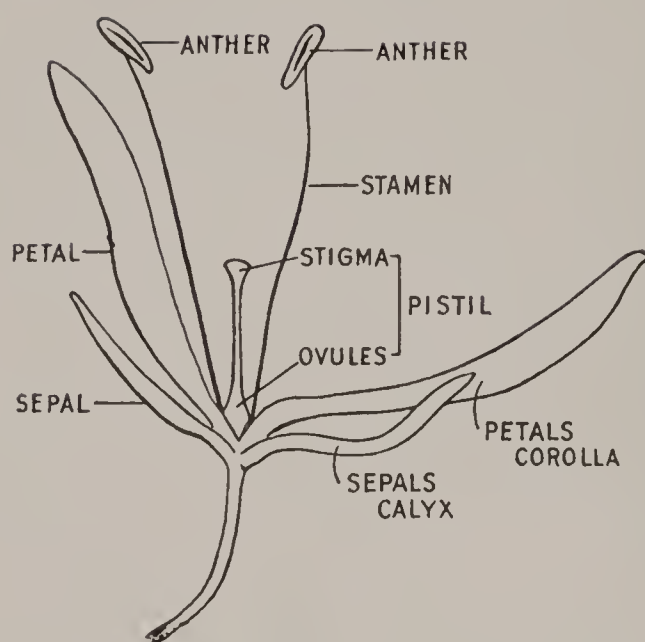


FIG. 3.—(After Atwood's "*Civic and Economic Biology*")

IV

CALIFORNIA POPPY

California's child am I,
Born 'neath sun and shining sky.
Open hearted is my bloom,
Each who loves will here find room.

You children of California know the Poppy as well as you do the Buttercup. You have seen it rush out after the first fall rains. It grows anywhere, along the railroad track, in grassy meadows, on sunny hilltop. It brightens so much of our land that we have made it our State Flower.

Has the Poppy the same corolla as the Buttercup? You see at once that it has not. It has only four petals. They are not varnished inside as the petals of Buttercup are. See how satiny they are. This satin finish turns the light into the eye of the insect almost as well as the buttercup's varnish does.

When Mrs. Bug sees this lovely field of color, she rushes to it. Does she find dishes of honey like Mrs. Buttercup sets out? No, she does not. Mrs. Poppy does not make honey for her visitors. She does make an extra lot of pollen so that they can eat all they want. Just dip your nose into the Poppy center. Ha! Ha!



FIG. 4.—California Poppy. (*Photographed by A. J. Soares.*)

Little child, "you're a dusty fellow,
You've powdered your 'nose' with gold."

As the visiting Bug is eating the pollen, she gets some dust over her. She carries this on her when she crawls into the next Poppy. There the stigmas get hold of the pollen and send it down to the ovules. The Poppy pollen makes the Poppy ovules into Poppy seeds, just as the Buttercup pollen makes the Buttercup ovules into Buttercup seeds.

See how different the calyx of Poppy is from the calyx of Buttercup. Is it not a dainty little nightcap? Sit still near a Poppy bed some bright warm morning. Keep your eyes on a green wrapped bud. The green cap begins to rise up slowly, showing the orange color inside. It rises higher and higher. Suddenly—Pop, off it shoots into the air! Then the four Poppy petals unroll themselves into the beautiful flower.

After the calyx is thrown off, the corolla does its work. Each night the petals wrap themselves tightly around the stamens and pistils. Or if the weather is cloudy or foggy or rainy, the petals curl tightly to keep the pistils and stamens safe from harm.

See how the Poppy petals sit upon a little platform. If you pull off a petal, what comes with it? If you pull off all four petals, what is still on top of the platform? Can you tell us, George, what is it that comes off with the petals?

"The Stamens?"

Yes that is right. And what stays on the platform, Gladys?"

"The pistil?"

Yes that is right. Look how the seed-case grows through this platform. See the little ribs along its sides. Watch it as it grows older. See how it twists until it opens and scatters its seeds. If a strong wind is blowing when the seed-case opens, the little black seeds get carried far off.

Notice Mrs. Poppy's leaves. Are they the same shape as the Buttercup leaves? Do they come out from the stem in the same way? Are they the same shade of green? Which do you think is prettier, a bunch of Buttercup leaves or a bunch of Poppy leaves?

Does the root of the Poppy die when the leaves fade away? See for yourself.

You can use the Poppy seeds at your doll parties. They are good to eat. You know we buy "Poppy Seed Bread" and "Poppy Seed Buns" at the bakeries.

If you had been born a Californian Indian long ago, your Mother would have boiled some Poppy leaves for greens for you. They might taste bitter to you to-day, when you are used to spinach, but they tasted good to little Wantasson two hundred years ago.

If you had been born a Spanish Californian boy or girl, your Mother would have fried some Poppy leaves in olive oil. Then, she would have rubbed this grease on your head. It made the

hair long and glossy. The Spanish Californians all had lovely hair.

To-day some people use Poppy juice to cure headaches or to make them go to sleep. I will tell you a secret. Cross your heart and promise not to tell. No, on second thought, I think it would be better to tell every one you meet.

Just spend some time each day out in the sunshine studying the Poppy habits. Then, you can snap your fingers at any old headache, and you will sleep as sound as a log.

Sweet dreams!

V

CREAM-CUPS

A pastoral scene delights the eye—
Sleek kine, still ewes, with lambkins spry,
And pannikins crowded on the hills
Which Flora's Fairy Jersey fills.

A little cousin of the Poppy is the Cream-Cup. You and I may think it does not look much like its brighter cousin, but then John Brown does not look like his big cousin Tom.

Botanists say they are cousins. Botanists are persons who have studied plants well. They say that the Poppy and the Cream-Cup are cousins. They know. When they say so, you and I must believe it.

The Cream-Cup colors a field as well as do either Poppy or Buttercup. Their pale light catches the eye of Mrs. Bug. At once she thinks of dining. She feels that there must be good food awaiting her in such a pretty setting. As she gets nearer, whiff! Her nose sniffs in pleasure. Surely a great treat awaits her.

Down she swoops onto a Cream-Cup. She smells the honey stronger. There down at the lower part of the petal a yellow spot shines into her eye.

"Boom! Boom!," she burrs. "What a pretty table is set for my dinner."



FIG. 5.—Cream-Cup. (*Photographed by A. J. Soares.*)

She crawls down quickly. As she goes, she knocks against the stamens. At once, the anthers open and pour their pollen over her. When she has eaten all the feast set in the first Cream-Cup, she goes to a second. Here the pistils are ready to make seed. As she passes down the honey paths in the cup, her legs touch the stigmas and shake some pollen on them. The stigmas send down the pollen to the ovules and the seeds begin to grow.

Let us look at a Cream-Cup. Is its corolla satiny like that of its cousin Poppy? Does it varnish the inside of its petals as Mrs. Buttercup does? Is its corolla woven of as thin material as is the corolla of Poppy or that of Buttercup?

Count the petals. You see that it has six, while Poppy has but four, and Buttercup has more than five. You see that three of the petals are set in a little nearer the center than the other three are. This is a very good plan. If it gets dark or wet or cold, Cream-Cup wraps her petals around her stamens and pistils to keep them safe. With such thick petals, she could not fold them tight enough if they were all set in one circle. You can try it with paper. Cut a flower of six petals all in one circle. Cut another flower in two sets of three petals. Now, wrap them up. Which makes the smaller bundle? Which will best keep out the cold?

Look at a Cream-Cup bud. See how hairy the calyx is. That is Cream-Cup's way of keeping her

baby flowers warm. You see the three sepals on the bud. Are they hairy inside?

Now look at a flower again. Is there any calyx on it? No, there is not. Now you see that Mrs. Cream-Cup has some of the same habits her cousin Mrs. Poppy has. She pushes off her calyx early. That is why her petals have to fold together tightly. They do the work of the calyx in keeping the pollen and pistils safe.

If you want to know how many stamens there are, you have to know how to count. No easy four or five about them. You see, studying flowers will help you in your counting work. You would dislike not to be able to count the stamens in a Cream-Cup, would you not?

There are a number of pistils too. At first, they are joined together in a ring. As they grow older, they loosen themselves from the ring and stand alone.

If you look at the leaves and stem, you see that they are well covered with hairs. This shows that Mrs. Cream-Cup likes to grow in the early Spring-time. She comes out in the warm sunshine, but she is ready for cold nights. She does not wish her plants to be frost-bitten before her flowers have made good seeds.

Do you know the seed-case of Cream-Cup? See how it swells out between the seeds. This gives every little smooth seed a tiny cell of its own. A dry seed-case will break easily between the two seed cells, and then the seeds fall out.

Do you play any games with Cream-Cup? We did not when I was a little girl, but perhaps other children did. If you know of any games with them, will you tell your Teacher? Then, perhaps, she will tell me.

You can draw the Cream-Cup easily. See how simple the leaves are. They are not cut into as are the leaves of Poppy and Buttercup. When you draw the flower, be sure to put in many, many stamens. Mrs. Cream-Cup is very sure she wants a big supply of pollen. And it is good pollen too.

Have some?

VI

BABY-BLUE-EYES

A little bit of sky
On Mother Earth's kind breast,
With smile of welcome shy,
Rewards our eager quest.

Is there one of you children who does not hail with delight the first Baby-Blue-Eyes you find in the Spring? Have you ever grown tired of this dainty flower? Even if you live next door to a whole field of Baby-Blue-Eyes, you will still love them. Their bright blue faces seem to be smiling up at us as sweetly as babies smile.

But if Baby-Blue-Eyes does remind us of a sweet little baby, she is not helpless. She is very well able to carry on her work. She is also very honest. She wishes to pay well any insect who helps her.

She waves her blue corolla above her leaves to invite Mrs. Bug to dinner. This lady is very glad to accept the invitation. She does not wait to send an answer. She hurries along herself, quite hungry for the feast. When she reaches Baby-Blue-Eyes, she finds several pleasant surprises.

Mrs. Baby-Blue-Eyes has not dyed all her corolla bright blue. Down near the center, she has kept it white. Lest the insects may not care



FIG. 6.—Baby-Blue-Eyes. (*Photographed by A. J. Soares.*)

for plain white, she has scattered dots of dark blue and black over the light places.

When Mrs. Bug comes near Baby-Blue-Eyes, her nose begins to tickle.

“Honey! Honey! Honey!” she hurries along, humming in time to her wing beats. “Hurrah! Hurrah! Hurrah!”

Look and see what she will find. You see the corolla is shaped like a bell. There are five petals, fitting nicely together to make a circle. Now look inside the bell. Each petal has set out food generously—not one dish, but two. Think of that! Two dishes of honey to each petal. Now, do you not believe that Mrs. Baby-Blue-Eyes has a generous heart?

There are little honey paths leading to the dishes. If Mrs. Bug should happen to have a cold and cannot smell the honey, she could still find it by using her eyes.

Mrs. Baby-Blue-Eyes does not want the smallest bugs, who can creep in without touching her stamens, to seat themselves at her table. She is willing to set out a good meal, but she wishes fair payment for it. So, she has hung a screen of fine hairs over her honey bowls. Your Mother puts screens at your windows to keep out the flies, does she not? Just so, Mrs. Baby-Blue-Eyes hangs up screens in front of her honey to keep out the bugs she does not like. Larger bugs, who will help her, can easily bend the hairs aside and stick their tongues in between.

Mrs. Baby-Blue-Eyes has shaped her little brown anther like an arrow. She turns it out toward the petal, instead of in toward the center, as many flowers do their anthers. When Mrs. Bug alights on a petal, she starts down a honey path. She knocks against the foot of the stamen. Like a flash, the anther springs open and pours fine grey pollen over her. It is like when you touch the button on the wall and your electric light flashes on. Just that quickly does an anther open when Mrs. Bug touches the foot of the stamen.

When Mrs. Bug has eaten all she wants in that Baby-Blue-Eyes, she goes to another. Here, as she goes in, her head is sure to brush against the stigmas. She leaves some pollen on them. They send the pollen down to the ovules and the seeds are started.

If no Bug comes to Baby-Blue-Eyes, after a while, she turns her anthers around, so that they face the center. Then, they open and the pollen falls on the stigmas in that same flower. Then seeds are made in the seed-case. Baby-Blue-Eyes likes better to have the pollen of one flower go to the ovules of another. It makes better seed. All plants like to have the pollen of one flower get to the ovules in another. That is why they invite the insects to help them.

Baby-Blue-Eyes feels sure that her plan of work is a good one to get the insect to help. So, she lifts up only five stamens. Remember how many stamens Buttercup and Poppy and Cream-Cup

raise aloft. They could lose lots of pollen and still make seeds.

Sometimes, the wind carries away the pollen from a flower and it falls on the stigmas in another flower. Do you think it is sure to fall on the same kind of flower? Is it as sure as if Mrs. Bug carries it?

Baby-Blue-Eyes does not depend upon the wind. She sets out to please Mrs. Bug and she succeeds. Mrs. Bug finds her honey so delicious that she is sure to try the same kind of flower for another taste of it. Some days, you just like chocolate soda, don't you, Ruth? No matter what kinds are offered you, you choose chocolate. And you choose strawberry, Harold. Well, it is the same with Mrs. Bug. Some days, her fancy is set on Baby-Blue-Eyes honey and no Buttercup soda or any other flavor will satisfy her sweet tooth.

The Baby-Blue-Eyes seeds are healthy. You can plant them in your gardens and they will grow into good plants. Florists have sent the seeds all over the World. Do you know what a florist is? I thought you did. The seeds grow well in far off countries. They grow healthy and send out many flowers. Their flowers are pretty to the people there, but they would look a little faded to us. The corolla is not so bright a blue as our wild flowers wear. Baby-Blue-Eyes, to be really beautiful, needs to look up at the California sky.

Let us keep out under the Californian Sky.

VII

BABY-BLUE-EYES, AGAIN

A little bit of sky
On Mother Earth's warm breast
Draws bees from far and nigh
And satisfies their quest.

Baby-Blue-Eyes has several sisters, natives of California. Most of them look like her. Their color is different, but their shape is the same. They have the honey paths, the honey bowls, and the hair screens. They are all loved by the insect world.

One of the sisters is quite different, but I think you can find her. Instead of growing near the ground, it climbs up and throws itself over bushes. Its stem is square. You can feel the corners. But be careful of your fingers. The stem is covered with little bristles, each ending in a hook and each pointing backward. It has these hooks to hold on to bushes with, but if you will put your hand in its way, it will hook into it. Hand or bush is all the same to Climbing Baby-Eyes, as long as it gets up in the world. It only wishes a support. It is really weak. If you pull your hand away, a long piece of stem comes too.

The leaves, too, are quite different from those of Baby-Blue-Eyes. They clasp the stem as if



FIG. 7.—Climbing Baby-Eyes. (*Photographed by A. J. Soares.*)

they were afraid of being swung so high in the air. They are cut into lobes and each lobe points down to the ground. It does look as if these leaves wished their mother plant would act as the other Baby-Eyes do and cling near Mother Earth.

The violet corolla is pretty and it brightens the brush-heaps over which the plant throws itself. They say that in the Spanish California days, the young ladies used to wear this Baby-Eyes on their party dresses. Pick some for your big sister the next time she is going to a party. Do you think she will want some a second time? Why?

Have you read the Californian Indians' story of how the Baby-Blue-Eyes came to be? It goes like this:

"Coyote had just made the World.

Eagle looked over it and saw that it was flat. She said, 'There is no place for me to perch.'

'That is easily changed,' said Coyote. He made some little round hills.

'Huh!' sniffed Eagle. 'Those are only footstools. I want high hills for my perch.'

'Well, then, Sister Eagle, make better ones to suit yourself,' said Coyote.

'Thank you, I will,' answered Eagle.

She set to work. She dug her claws into the earth and scratched up some mountains. She worked very hard. Some of her feathers fell out as she worked. These feathers stuck in the ground and began to grow.

The long feathers grew into trees. They became pines and redwoods and other tall trees.

The pin feathers grew into bushes. They became manzanita and coffee-berry and other bushes.

The soft down from her breast grew into small plants. It became Baby-Blue-Eyes and Buttercups and Cream-Cups and Poppies and all the little flowering plants."

Is not that a pretty story? Most of the Indian stories of the Nature around us are pretty stories. The Indians lived out of doors most of the time. They looked carefully at all things around them. They knew about the animals, and they knew about the plants. Some plants they knew were good to eat. Some were good to cure man if he were sick. Some were not good to eat nor good for medicine, but they were beautiful to look at. We need beautiful things as well as useful things. The Indians thought Baby-Blue-Eyes looked like a bit of sky fallen to earth, and they loved it.

Don't you?

VIII

WILD HOLLYHOCK

Hollyhock, with fragrance laden,
Curtsies gaily to the Breeze.
That old Gossip steps out lively
To spread the news among the Bees.

When the Poppies and Buttercups, the Cream-Cups and Baby-Blue-Eyes are all coloring the fields, you see spots of pink here and there. Then, you know Wild Hollyhock has come to town. Her color is delicate, but she is well built to carry on her year's work.

Pick a stem. See how the lovely bell-shaped blossoms are all crowded to its top. Look at one blossom. It looks as if it were made of dainty pink gauze. It has many heavy white lines leading down to the center. You exclaim, "Aha! Miss Hollyhock is calling the insects."

Even if your eyes did not see these honey paths, your nose would tell you she was making honey. And such honey! Sweeter even than that of Baby-Blue-Eyes. You find the little bowls well filled. Over each bowl is the curtain of fine hairs. These hairs are so fixed that if any drop of dew falls on them, it will slide off without dropping into the sweet dish, which is thus kept pure. The bees



FIG. 8.—Wild Hollyhock. (*Photographed by A. J. Soares.*)

just love this feast and come for miles around to get it.

Look again into Miss Hollyhock's bell. Look well at the stamens. In Baby-Blue-Eyes, you found five stamens standing up on the corolla. In Hollyhock, you find them standing close together in a ring. They look like a little vase. When you get older, you will be able to divide this vase into two circles of stamens. Now, you only need see that the little anthers are a lovely rose pink and their pollen is a creamy powder.

You will find that the pistil is inside the stamen vase. The pistil does not grow out until after the anthers have thrown their creamy powder away. Then, it grows out higher than the stamen vase. You see it gets ready to make seed too late to use the pollen from its own stamens. These were ready so long before, that their pollen was carried away. It could not get any pollen to make seed, if Mrs. Bug did not bring it some from another flower.

But with such a bright gown and with such delicious honey, Mrs. Bug is sure to come. And after a taste, she is sure to go into another Hollyhock for some more of the good food. She visits one Hollyhock after another. In some, the stamen will be sure to be ready to throw out the pollen. In others, the pistil will be ready to receive the pollen. So, Miss Hollyhock is sure to make good seed, and Mrs. Bug repays her for setting out the good meal.

After the pollen has fallen on the pistil, Miss Hollyhock does not need the bug any longer. She does not make any more food. She is a very honest person. She does not wish to bother Mrs. Bee unless she is going to pay her. So, she changes the bright pink of her corolla to dark purplish color. This sign means "No more parties in this flower."

"Hmm!," hums the Bee. "Is that so? Well, I'll go to a lighter colored Hollyhock."

And she swings into a newly opened Hollyhock and helps it do its work.

When the seeds begin to grow, the corolla falls off, but the calyx clings on.

In the flower bud, you can see how the sepals fold together to keep the flower safe. See how furry they are outside and how silk-lined they are inside. You see there are just as many sepals in Hollyhock as petals, five sepals and five petals.

If you look at a flower stalk, you will see that the buds nearest the ground bloom out first. When their corollas fall off, the next higher buds bloom out. And so the pink flowers creep up the stem higher and higher until the very top one waves. Look at other plants and see if they all bloom this way. Do those in your garden at home bloom from the bottom of the stem up?

Look at the leaves. Some are nearly round. Others are cut into parts. Put a round one on a sheet of paper. Draw a pencil mark around

its edge. Now put a cut-into leaf down. Draw around its outer edge. You see the leaves are the same shape. You will find it easy to draw a Hollyhock stem if you will remember the outside line of the leaves. The buds are not hard to draw. The flower is not hard to draw. A stalk of Hollyhock makes a pretty picture.

Are the round leaves just the same color as the cut-into leaves? Are the leaves the same color on their tops as on their lower surfaces? Have both kinds of leaves hairs on them? Have the leaves near the flowers got stems as long as the leaves near the ground? Did you ever try to get a dye out of the leaves? Just try it.

Do you use the Hollyhock seeds at your play parties? Look how the seed-cases divide. We used to play that they were parts of an orange. They are good to eat. Watch which birds come to eat them.

Miss Hollyhock has a sister who is a greater help at a Doll's Party than she is. This is Mallow who comes into all your gardens. She comes up along all the streets, wherever there is the tiniest bit of earth. Now, do not turn up your nose and sniff, "That weed!" Her seed-cases are the "cheeses" children all over the world play with. They are dented just to be cut up like pies. We call them "cheeses" and so do the children in England. The children in France and the children in Spain play with them and call them "cheeses" in their own language. Do any of you boys

or girls know how to say "cheese" in French or in Spanish? Tell us.

Isn't it fun to think that we are playing party with the same kind of seed-cases that children in other countries are playing with? Mother Nature sends along many interesting things for children.

Keep your eyes open.

IX

FILAREE

Filaree, dear Filaree,
Tell me the Truth, I pray
Does my Mother want me now?
Or may I longer play?

Another common plant with divided leaves is the Filaree. You have seen its rosettes of green leaves springing up all over the ground after the first rains. Is that not a pretty way to group the leaves?

Take one leaf stem and lay it on paper. Draw your pencil around the outer edge. Make the little cut leaves all point the same way. There. You have drawn a Filaree leaf. It is not hard to do if you remember to look carefully at the outer edge.

As you fingered the leaves, you found them fragrant. They are said to be "musky" because they carry this fragrance of musk. Has your Mother in her garden a Rose Geranium? Take some leaves of it and some of Filaree. You see they look somewhat alike. They smell somewhat alike. Their flowers are somewhat alike too. They do not send out their stems alike. They do not grow to the same height. But, they really are cousins.



FIG. 9.—Filaree. (*Photographed by A. J. Soares.*)

The Filaree gets its green rosette placed early in the year. Then, it can send out its flowers early. Can you see its flower as far off as you can a Buttercup blossom? Neither can Mrs. Bug. But if the flowers rush out before the bright colored ones bloom, Filaree will have numbers of visitors.

She sends up from her green rosette slender stems tinted red. These catch the eye of Mrs. Bug better than if they were colored green. On top of the stem, she pushes out a number of small flowers. Each has a little stem of its own, so it waves quite freely in the sunshine.

The calyx has five sepals and the corolla five petals. The corolla is not always the same color. You find them pale pink or rose pink or lavender or purple. Whatever the color, you find little honey paths on all the petals. You know now that these paths show the insects the way to the honey bowls.

You also know that while Mrs. Bug eats, she jostles the five stamens. Then the five anthers pour their pollen on her. When she goes into the next Filaree, she leaves the pollen on the stigmas. Then, a very wonderful thing happens.

You would think that Filaree's tiny pistils would grow into small seed-cases. Now, would you not? But you do not know Filaree. She suddenly grows tired of having small regular parts. She decides to make a surprising seed-case.

There! See! Her seed-case is your old friend "Clocks." Have you not stuck them on your sleeve and watched them unwind? We used to see "if our Mother wants us" by them, when I was a little girl. If they unwound right to the top, our Mother wanted us right away, and we had better start home quickly. If they kept a few twists in, we could play a while longer.

Then, we made dolls' scissors of them. Take two green seed-cases and stick the end of one partly through the other. They look like a pair of scissors, do they not? How well will they cut? Do the Fairies use them in their dressmaking?

Mrs. Filaree makes these wonderful seed-cases for her own use. She wants to get her seeds carried far off to new ground. She can get them carried off in two ways. If John or Mary or Old Ponto or Baa! Baa! Black Sheep passes, there! Some seed-cases catch in their clothing. They carry them away from the Mother Plant and drop them somewhere. You, John, and you too, Mary, know that you had to pull them out of your stockings, did you not? They would have been still riding there if you had not jerked them out and thrown them away. Sometimes Baa! Baa! Black Sheep goes thousands of miles away. She goes to a new country, with some Filaree seed-cases stuck in her wool. That is certainly far enough off from the Mother Plant to suit even Mrs. Filaree.

If no living thing passes, Mrs. Filaree has another plan to send her seeds over the earth. She has

grown on their ends those long silky hairs. Some warm day in April or May along comes a nice warm wind.

“Good-bye, children,” says Mrs. Filaree. “Get aboard this soft wind. Its a fine chance for a free ride.”

The Filaree children do not refuse a free ride any more than you do when Mr. Brown stops his automobile at your door and invites you in it.

They give themselves a twist. That loosens them from the stem. They spread their long silky hairs on the breeze and sail away to new scenes.

Look at the lower part of the seed-case to see what happens when it reaches the ground. See on its end the little hook. And on its sides the little bristles that curve upward and outward. These are what catch in your clothing as you pass.

When the seed-case falls to the ground, if it is a warm day, it curls up its parts. When dew or fog falls, it straightens them out. When sunshine comes again, it curls them up. It does this over and over. Curls up with the sunshine. Straightens out with the dampness. It gets its little bill into the ground. It bores down farther until it is covered with earth. Then, it lies still and waits for the early rains. As soon as they reach it, Filaree's seed begins to work lively. It hurries and pushes up a lovely rosette of soft green musky leaves, and Filaree's circle of work goes on.

These wonderful seed-cases have carried Filaree all over the World. She travelled in Asia and in

Africa on a camel. She crossed to Spain on a goat. She sailed to Mexico on a Merino sheep. She rode up to California on a horse. What do you think of that for free travelling?

The Filaree has repaid all these animals for acting as motors. They all love to eat her musky leaves. As she grows older, she sends out longer stems with little branches and many, many leaves on them. Look at the place where the little branches leave the stem. See how swollen it is. If you look at your Mother's geraniums, you will see that their stems swell out where the new branches start. If you look at the geranium's seed-case, you see it is like Filaree's. They both look like a crane's bill or a heron's bill. Botanists call the geranium a name that means "crane's bill" and Filaree a name that means "heron's bill."

Is not "Filaree" a pretty word? It sounds like a song. It really is not an English word. It comes from the Spanish name of the plant. The little Spanish Californian boys, Pedro and Juan and Carlos, took their horses to the pasture to eat "*Alfilerilla*." To-day, Peter and John and Charles, take theirs to munch "Filaree." The Spanish name comes from needle, because the seed-case is sharp like a needle. As the years have passed, we have shortened the name to "Filaree." Some children call it "Stork's Bill." What do you call it? What games do you play with it?

Study the Filaree growing out in the sunny field. See what visitors help it. It may not offer

you a feast as it does Beetle and Bossy, the calf, but it will afford you many happy hours. And as for health, just watching it carefully, will make you a Samson.

Good health! Many travels.

X

MINER'S LETTUCE

My flowers may be small,
But my leaves make it up.
They are ranged with good taste,
And taste good when you sup.

Have you ever used Miner's Lettuce for your play parties? We used to eat it when I was a little girl. The Forty-Niners were very glad to eat it. It was a fine change from the beans they had at every meal. You know who the Forty-Niners were, do you not?

They were the men who came to California in 1849. They came to find the beautiful yellow gold that had just been discovered in the Sierra Nevada Mountains. There were no roads to the Mountains in those days. It was hard work to get to the gold fields.

Sometimes a miner could buy a horse near the Coast and pack what he needed on its back. Then he led it through the rough country many miles to the bank of some river. The river was carrying gold down from the mountains. The miner camped on the river bank. He found the yellow gold in the river sands.

But most times, the miner could not find a horse to buy. Then, he packed his blanket and tools and food on his own back. His blanket and pick



FIG. 10.—Miner's Lettuce. (*Photographed by A. J. Soares.*)

and frying pan were heavy, so he took light weight food. He often carried just flour and salt and beans. Then, for weeks at a time, he would have "flap-jacks" and "*frijoles*" three meals a day. Do you know what they are? How would you like to eat them three times a day with nothing else? Even if you were living out in the open air day and night and working hard, you would get tired of them. Would you not?

Think how glad the miner was to find a bed of this fresh lettuce. He used to eat all he could get. That is why in California we call this plant "Miner's Lettuce."

Sometimes it is called "Indian Lettuce." That shows that the Indians were fond of it. Often, they put some lettuce near the hills of the Red Ant. The Ants, as they went about their own business, crossed back and forth over the lettuce. After a while, the Indians would shake them off and smack their lips over the lettuce. It tasted sour then, like salad does.

The Indians sometimes cooked the lettuce. They filled an Indian basket with water. They put a hot rock into the water. When the rock was cool enough, they took it out and put another hot one in. They kept putting in hot rocks until the water boiled. Then, they put in the lettuce leaves and cooked them. It tasted something like spinach. The Indians knew it would make them healthy, just as your Mother knows that spinach will make you healthy.

Let us look at the Miner's Lettuce. Take a stalk in your hand. See how tiny the white flowers are. If they grew on little stalks near the ground, would they catch the eye of the flying insect? You can see that they would not.

Mrs. Miner's Lettuce, a long long time ago, learned that they would not. Even when she raised the stem up higher, the bees did not stop to look at such tiny flowers. So, she tried a new plan to make them look at her. She put two leaves high up on the stem and joined them together around the stem. She pushed the stem up higher than these leaves. Then she sent the flowers out on this top stem. They now show out very well against the green leaf circle.

When Mrs. Bee is hurrying through the air, her eye is caught by something white on a green circle swaying on a slender stem.

"Buzz! Buzz! What is this? It looks like food. I'll have a try at it."

Down she swoops.

"Buzz! Buzz! It *tastes* like food."

She eats all the sweets in that flower.

"Buzz! Buzz! How good that is this hot day. I must have more of it."

She goes from one Miner's Lettuce flower to another and then to another until she can eat no more.

And you know that that is just what Mrs. Miner's Lettuce wants. You know now that when Mrs. Bee sipped at one flower, she got pollen from

the stamens on her legs. She carried it to the next flower. Here the top of the pistil scraped it off her legs and sent it down to make the ovules into seeds.

Look for yourself at the Miner's Lettuce flower. How many petals has it? Is the corolla the same color in different flowers? Do all the buds on one stem bloom out at the same time? How many sepals has a flower? Can you count the stamens? Have you seen the seeds when they are ripe? They are black and shining.

Some warm afternoon, when you feel lazy—the best of us feel lazy some warm afternoons—just lie down by a Miner's Lettuce bed. Fix your eyes on a seed-case that is ripe. If you watch closely, you will see it curl inward into three parts. Then, pop! Out go the little black shining seeds. The seed-case throws them out so that they will not fall beneath the leaves of its own plant. If they fell beneath the plant, they would not get sunshine to make them grow. When the seed-case throws them out, they have a chance to fall upon some bare spot of earth. Then, the dew wets them and they get heavy and sink into the earth. Soon, the sun calls them, and they send out green leaves.

Do these leaves near the ground look like the ones near the flowers? Are the ones near the flowers all the same shape? Do they all turn the same way? Which leaf is easier to draw, the one at the ground or the one in the air? Which tastes

the best? You need not be afraid to eat as many as you want. They are not like candy. They will help make good blood and good bones. They will keep you healthy, to-day, just as they kept the miners healthy in 1849.

Lettuce for Health!

XI

WILD PORTULACA

A rich prize for the children
With their "pin-a-pop-a-show."
A picnic for the wild dove
Who reflects your crimson glow.

Miner's Lettuce has a pretty sister, who will also help you at your parties. At first look, you would not think they were sisters, but they are.

Some people call Wild Portulaca "Red Maids" because she wears such a beautiful red dress, but I think more people know her by the name I use. You have seen her coming up along the roadside, or in a field where the grass is not high. The little stems spread out and send up many flowers, so that a Portulaca bed is very beautiful when the sun shines on it.

Portulaca wears a beautiful rose-purple corolla. It is much larger than the tiny white one of Miner's Lettuce. Its petals are so velvety that they throw back the sun's light straight into Mrs. Bug's eye. They do not need a circle of green for a background.

Portulaca has a lighter center where she has set some dishes of honey. She has placed dark little honey paths leading down to the party. Mrs. Bug likes the smell of the honey and soon



FIG. 11.—Wild Portulaca. (*Photographed by A. J. Soares.*)

finds the dishes of it. Then, she likes the taste and decides to go to other Portulacas for more of the same kind.

The anthers of Portulaca are bursting with a rich orange pollen. As soon as Mrs. Bug touches the stamens, the anthers pour out their rich store. Mrs. Bug is nicely powdered. She carries this pollen to the next Portulaca she visits, and there the stigma gets it down to the ovules. Then, soon new seed is ripening.

If she wishes Portulaca honey, Mrs. Bug has to work while the sun is shining brightly. Portulaca is very much afraid of dark and cold. As soon as the sun passes from her, no matter how warm the air is, she draws up her velvety petals close around her lovely anthers.

Are the petals as velvety on the outside as on the inside? Why? Count the petals. Are there the same number as in Miner's Lettuce? See how they fold around each other. When they are open, do they form the same shaped corolla as Miner's Lettuce wears?

Look at the calyx. See the shape of its two sepals. Each looks like the keel of a boat. That is a fine shape for a calyx. The two sepals can fold over the corolla and keep it safe. You can float these sepals for fairy boats, and no water will soak in.

Look at the leaves. You see they are scattered up the stem as well as bunched at the bottom. Which leaves are the thickest, those of Portulaca

or those of Miner's Lettuce? Which is easiest to draw? Which tastes the best to you?

The seeds are good to eat, too. Do you like them? The wild dove just dotes on them. Often you see flocks of doves picnicking on a Portulaca bed. They have a very merry time. They eat so fast they forget to mourn. If you sit very still, they will go on with their frolic, stepping daintily and turning their heads to the side as they snap up the shining seeds. If you move, they will get frightened and fly away. You can talk gently. That will not frighten them. Wild birds do not seem to mind talking. They do mind a move of the arm or the leg or the body.

So, if you wish to watch the wild doves on a picnic, sit down near a Portulaca bed and keep still. See how gracefully the dove holds her neck as she swallows. On her neck, the feathers have caught some of the same beautiful rose-purple that Portulaca has used in her corolla. Perhaps the Dove's feathers have that shade from eating Portulaca seeds.

Take some of the seeds in your hand. See how black and shiny they are. See that they curve out on both sides. If two seeds start rolling down hill, which will go the farthest, a flat seed or a rounded seed? Portulaca thinks a rounded seed will get farthest from the mother plant and so she makes her seeds that shape. Then, when the seed-case throws it out, it may roll away to a new piece of ground.

Do children to-day make "Pin-a-Pop-a-Shows." When I was a little girl, we used to take the petals of flowers and arrange them in a pretty design on the back of a card board box. Then we would paste them on so that they could not fall off. Then we cut a hole in a piece of paper and stuck it on the front of the box. Then, we went around the school yard calling, "Who wants to see a 'Pin-a-Pop-a-Show.'" Everybody who had a pin wanted to see and they got long peeps for a pin. I do not remember what we did with all the pins we got.

I do remember that I used to make my shows out of Portulaca petals. They were so rich looking, like my Grandma's best dress. And then some of the petals got crushed as I worked, and my fingers got all rosy with the lovely dye. O, the joy of those rose colored fingers!

I am ashamed to tell you that I was a big girl before I knew that the right name of the Show was "Pin-a-Pop-a-Show." My ear caught the name when I was very little, as "Pinny Poppy Show," and that is the way I used to call it out for some years. I thought it had something to do with Poppies and Pins, but I used any flowers I thought pretty.

Of course, you children to-day would not be so careless. You listen carefully to new words, do you not? You have to, if you wish to get them right. Grown-up persons have such a bad habit of talking too fast, and some of their words just slip past a little child's ears. If your ear gets a

word wrong once, you have some trouble teaching it to know it right. Dear Me, if we were just like the birds and knew all our words from the beginning, wouldn't it be easy?

But, then if we were birds, we could not make "Pin-a-Pop-a-Shows," and that would be a loss. It is worth your while to make some. Take any flower you like, a Portulaca, a Poppy, or a Baby-Blue-Eyes. Try the petals on a piece of paper in all sorts of ways. When you get a design that you like, paste it. These designs will teach you how to plan wall paper or carpets, or cotton materials for your shirts or dresses, or covers for your books. Look around your home and see how many things have designs on them. Look at the magazine covers. Many men and women earn a good living making designs.

So, you can practice designing with Portulaca petals. When you get a charming design, make it into a "Pin-a-Pop-a-Show," and go around giving your classmates the pleasure of seeing it. Call loudly and clearly, and charge a pin for a good look.

Good business! Rosy fingers!

XII

WHITE FORGET-ME-NOT

Dear bonny little blossoms
A-snowing o'er the field,
The winds waft wide your welcome
To Folk who wish your yield.

You all know the wild White Forget-Me-Not. I think every child loves it. It looks so sweet and clean, shining up from the ground, that you want to be just like it. What do you call it?

The Spanish Californian children used to call it *nievitas*. That means "little snow flowers." A field of White Forget-Me-Not does look like a field of snow.

Have you ever seen snow? If you have not, look at the next field of White Forget-Me-Nots and play that they are snow. Though they will look like snow, they will not feel like it and they will not act like it. Snow is cold. Snow melts when the warm sun shines upon it, and soon runs away as water. Then there is no snow.

The White Forget-Me-Nots love the sun. When the warm sun shines upon them, they send out more and more blossoms. Then, there is a whole field of White Forget-Me-Nots and that looks like snow.

The children in the Sierra Nevada Mountains call White Forget-Me-Not "Popcorn." A field of it does look like a field of popcorn, does it not?



FIG. 12.—White Forget-Me-Not. (*Photographed by A. J. Soares.*)

-Children often find very good names of their own for flowers they love. The children who call White Forget-Me-Nots "popcorn," eat the flowers to get the sweet syrup they hold.

Mrs. White Forget-Me-Not makes this sweet stuff to be eaten, but not by children. No indeed. She wants it to be eaten by some creature who can help her make good seeds. She makes a great lot of it in each flower. The wind carries the fragrance of it away from the field. Soon the wind passes a bee and it gets a whiff of this sweetness.

"Buzz-z-zz." She nearly falls on her back, she is so excited. "That is the sweetest air I have met to-day. I must follow it up to see what it comes from."

She keeps her nose to the wind. Then winging fast and singing fast, she soon reaches the field of White Forget-Me-Nots.

"Buzz-z-z-zz." Her voice sounds happy. "This is just where I want to be."

Down she flies onto a little White Forget-Me-Not. Its feast is soon eaten, and she goes to the next flower. From the stamens, she takes some pollen and fills her pollen bags. Then, winging fast and singing fast, she gets home to her hive.

"Buzz-z-z-zz," she calls to all her fellow bees. "Come with me! Come with me! The wind led me to a heavenly pasture. We can fill our hive in one sunshine."

"Buzz-z-z-zz! Buzz-z-z-zz," the fellow bees cry. "Lead the way. Lead the way!" Bees always believe what a fellow bee says.

And, winging fast and singing fast, hundreds of bees soon arrive at White Forget-Me-Not field. You'd better not get in their way. They do not wish to hurt you, but their work has to be done while the sun shines.

If you interrupt Mrs. Bee's work, she will buzz "Get out of my way! Get out of my way!" several times in great excitement.

If you do not obey quickly, "BUZZ!" comes sharply, and you are stung. Then you *do* get out of her way. It is always best to obey Mrs. Bee the first time she speaks.

Mrs. White Forget-Me-Not knows that if her flowers bloom a long time, she will have more chance of visitors. She does not spread her buds out on the stems. Just look at a flower stalk. See how it is curved around inward. Only the outside buds can receive the sunshine. They will bloom first into flowers. It takes sunshine to make a pretty flower just as it takes sunshine to make a pretty child.

When the first flowers have been visited by the insects, then the stem uncoils a little and lets the next buds face the sunshine. Then they bloom into flowers and their honey is eaten. Then the stem uncoils a little more and lets other buds get warmed by the rays of the sun. After a while, the very last bud is blossomed. Then, the stem is a straight line. If your Father has an old watch spring you can play with, put it on the table

beside a Forget-Me-Not stalk. Work them both. Draw them both.

Examine the flower yourself. Count the sepals. Now, the petals. Now, the stamens. When the seeds begin to grow, see how the corolla falls off. Forget-Me-Not does not need it any longer. She only set it up to catch the eye of the insects.

You children can find a use for the cast-off corollas. String them on a fine thread. There. You have a fairy necklace. Perhaps it was one like this that the Fairy Godmother hung on Cinderella's neck. But it must have been corollas from some other flower, for surely Forget-Me-Not would have warned Cinderella that the clock was going to strike.

White Forget-Me-Not does not throw aside the calyx with the corolla. She wants it to keep the growing seed-case safe. It is not only the cold or the wet that might harm the baby seeds. Sometimes a caterpillar crawls up a nice little green stem. He eats the seeds if he finds them soft and easy to get. The White Forget-Me-Not has no use for caterpillars. They would never help her. So she makes her stems hairy to give them a rough road to travel. She makes her seeds nutlike. They are not easy on a caterpillar's mouth. Mr. Caterpillar soon lets himself down to the ground and seeks an easier meal.

When Forget-Me-Not's seeds are ripe, they have a rough covering. They can catch on any passing surface. Then, they will be carried off

to a new field. Perhaps they will ride off on your clothing. You will never feel their weight. You might be glad to play horse for Mrs. Forget-Me-Not. She will give you much pleasure if you watch her and her sisters during the coming years. The older you grow the more you can learn about her. Perhaps fifty years from now, you may know more about her family than any one else in the World does. Then, you will remember that you started being friends with her in this little book. Won't you?

Forget me not.

XIII

WALL FLOWER

A perfect posy in your mien,
A perfect in your acts;
When you attract by golden preen,
You always keep your pacts.

If you wish to study a flower that *looks* like a party and *smells* like a party, just take a wild Wall Flower. Mrs. Bee and all the Bug Brothers know it *tastes* like a party.

The one I am looking at is a rich golden color. Some come a paler gold; some come as light as the canary; some come as dark as an orange. They all make this wonderful honey.

The flower has such a strong fragrance that you can smell it far away from the flower bed. Yet the fragrance is so fresh and clean-smelling that you can stand right among the Wall Flowers and draw in deep breaths of their sweetness and not grow faint.

If we can smell the honey far away, you may be sure Mrs. Bee can smell it still farther. We do not have to get our food by smelling for it. So our nose is not well trained.

But Mrs. Bee has no grocery store to buy food from. She has to collect food to put in her store, the hive. She has to go to the wilds of Nature



FIG. 13.—Wild Wall Flower. (*Photographed by A. J. Soares.*)

to seek food to carry home to the hive. So her nose is well trained.

Imagine her some sunny morning when she got up too late and felt a little cross. Nothing suited her. She started on her day's work all grumpy. Oh, children, it is a good thing for you that you did not meet Mrs. Bee that morning. I tremble to think of what might have happened if you had got in her way.

The sunshine warmed her wings. She began to feel a little more spry. She moved a tiny bit faster. She circled a hill.

"What!" She held herself still in midair. "What is that sweet, sweet smell coming around the hill. I must speed to it."

Grumpish no longer. Forgotten is her crossness. Off she speeds. If she were an automobile on our streets, the Traffic Officer would arrest her. But, luckily for Mrs. Bee there are no streets laid out yet in the air.

She does not look down at the Buttercup nor at the Baby-Blue-Eyes. They can set out dishes of good honey. But no party of theirs ever smelled so sweet as this feast that is ahead of her.

Over the wild Wall Flower bed she pauses. It seems too good to be true. A wonderful color with a wonderful smell. Down she slides on a sunbeam and slips into the nearest blossom.

"Oo-oo-oo." Just listen to her joy. The taste is wonderful, too, and there is lots of it to taste.

Look at the Wall Flower and see how beautiful it is. The golden corolla is made up of four petals. They are set to make a cross. They are not satiny like the four petals of Poppy. They look like soft velvet. See the little honey paths leading down to their party dishes. Pull out a petal. See how it narrows into a claw to fit into the calyx. Is the claw as velvety as is the blade that spreads out above? Are the honey bowls on the petals? Why, where are they? Look. They are as easy for you to find as for Mrs. Bee.

Look at the calyx. It has four sepals. See that all four of them are not the same shape. Two of them swell out at the bottom. That makes a good cup to hold the flower in. Do the sepals fall off as early as do those of Poppy and Cream-Cup?

Now count the stamens. "Six." Yes, that is right. Have any of the other flowers you have studied had six stamens? There is something odd about the stamens of wild Wall Flower and all the members of her family. They all have six stamens. All the stamens are not the same length. Most flowers have all their stamens the same length. Wall Flower has four long stamens and two short ones. All her family has.

Her family name is no harder for you than automobile. You do not think that a hard word do you? Because her family arranged their four petals in the shape of a cross, they are called "*Cruciferae*." That means "cross bearing."

A good reason for knowing this name is so many of this family live right around you. You learn the family names of your boy and girl playmates, do you not? You learn it whether it is as easy as Smith or as long as Shaughnessy. No boy or girl's name is too hard for you to learn. So, let's learn the family name "*Cruciferae*" and see which members of the family live near us.

We can tell them by their cross. Some have a white cross. The lovely Spring Blossom is one. It comes out very early after the rains. First it hides under the bushes, as if it were afraid. Then, it comes right out on the open hillside and grows stronger. The Water Cress is white, and the Shepherd's Purse and the Pepper Grass. The Mustard is yellow. The Radish is pink.

Those two good vegetables that help make you strong, the Cabbage and the Cauliflower, belong to the family. Just look around on your way home from school. If you live in the country, you will find many different ones. If you are in the city, some are sure to have a setting in the edge of the sidewalks.

Some grow tall; some will be small. You will know them by the cross of their corolla. All will have the six stamens, four long and two short. In each, you will find dishes of honey. None will have quite so much honey as wild Wall Flower, but all will have enough to get the insects to help them make good seeds.

When it comes to their seed-cases, now *there* is joy for the child. There are so many shapes. Wall Flower has a four sided pod. The Radish has her pod swelled out every now and then so that it looks like a string of beads. The Shepherd's Purse has heart-shaped cases, like the purses the Shepherds used to carry a long time ago. All the seed-cases are good to eat. They are a little peppery, but they will not make you sick.

A *Cruciferae*, the Black Mustard, takes a part in the story of California. When the first Spaniards came, there were no roads in the State. There were not even trails. They built the first Mission at San Diego. Then, they came north to build one at Monterey. They did not wish to lose their way in going from one Mission to another. They scattered the seeds of the Black Mustard as they walked.

As soon as the rain came, these seeds grew. They grew into tall plants. After that, the Spaniards could find their way by the line of the Mustard plant. It grew so tall that the larks used to love to sit in its branches. They sang lovely songs as they swung among the yellow flowers.

It grew so tall that the first American settlers used its branches to build their first sheds and chicken houses. It served all right, while they took time to make adobe or to cut trees into lumber to make more lasting buildings. Is there any near you tall enough to make a play house?

Whether there is any Black Mustard near you or not, there must be a wild Wall Flower. It grows all through the State. It is just as fragrant at the ocean's shore as it is near the tops of the Sierras. It just glows with delight in giving sweetness to the world, and we delight in its sweetness as much as do our friends, the Bees.

“Sweets to the sweet.”

XIV

SHOOTING STAR

Twinkle, twinkle, Shooting Star
We don't wonder what you are.
On the Earth, your gay clad form
Captures every heart by storm.

One of the gayest robed of our Spring flowers is the Shooting Star. I am sure you all love it because every one I know, whether boy or girl, man or woman, loves it. On its side, it seems to love California for it grows from the South to the North and from the Pacific to the heights of the Sierras. Sometimes it is small; sometimes large; sometimes pale; sometimes ruddy; but always it is lovely.

The whole plant works to make the beautiful flower. You know the clump of thick green leaves that cling close to the ground. They come out so early in the Spring that Shooting Star has to prepare them against the biting nips of Jack Frost. She makes them hug Mother Earth and also cling close together. She makes them thick all through. She does not cut them into parts as Buttercup does her leaves. All this so that they will be warm in the cold Spring winds and can help raise a lovely blossom head. Their upper side is shining to catch the eye of passing insects, but their lower side is covered over for warmth.



FIG. 14.—Shooting Star. (*Photographed by A. J. Soares.*)

Up from the center of this clump of leaves arises a strong thick round stem with no branches. When it reaches the point where the flower stalks will start, it swells out all around. From this swelled point, many little stalks climb up higher. Each bears a flower bud.

Shooting Star must have had an Artist Fairy Godmother. No common, ordinary, every day Fairy Godmother could think of such a lovely flower to wish on her. You see the five petals are joined together in front into a short tube and then are flung back in graceful banners. The tube is colored a dark maroon, with bands of yellow and white to enliven it. The banners are rose-pink like the soft clouds in the eastern sky at dawn.

The stamens are made to add to the beauty as well as to do their life work. Their stems are short and fixed inside the corolla tube; but the anthers are long and form a ring outside the tube's top. They are colored a dark violet, and they shine like velvet against the yellow and white circles on the petals. Through this anther ring, the pistil extends like a beak.

While the petals bloom, the five sepals curve backward to give them all the room. When the seeds are growing and the petals fading, the calyx straightens itself up around the seed-case.

All the Shooting Stars at the top of the stem do not bloom out at once. Indeed, several weeks pass from when the first beautiful corolla flings its banners wide until the last one drops off its ripen-

ing seed-case. Shooting Star has a very good reason for this. It is the same reason she has for grouping her flowers together at the top of her stem.

She raises her stem above her leaves so as to be easily seen. She sends out a group of flowers together so as to make a greater mass of color. She has the flowers bloom at different times so that the color will be waving longer. All her plans are made to catch the insects' eyes. She must interest them through their eyes. She has not much honey to offer them and little fragrance to attract them. She can give them plenty of rich pollen if they like that. But the first thing to do is to attract them to the pollen.

The insects do see the bright corolla. They do come buzzing along. They are not so excited as when they received the Wall Flower's invitation, but still they do come. When they push their heads into the anther ring, they get the pollen all over them. Then, when they visit the next Shooting Star, the long bill of the pistil touches their head and takes off the pollen.

Shooting Star is careful of her pollen. Her anthers hold it fast until something shakes them. If no insect comes before the flower grows old, then the pistil beak turns the stigma up, and the anthers let the pollen fall upon it and the ovules receive it.

Have you noticed the little stalks that hold the flowers? When they hold a bud, they stand up straight to let it get the sunshine. When the

corolla opens, they curve downward so as to protect the pollen from the wind. When the seed is formed, they straighten up again, holding the seed-case to the sun. Do you know how this seed-case opens and lets out the seeds. Watch it.

Did you ever dig up a Shooting Star and look at its root? If you plant one in your garden, you may have a new Shooting Star there next year. Try the seeds too. Take a ripe seed-case and scatter the seeds without touching them. Scatter them in some warm spot where the wind will not come. They know how to get underground themselves. Perhaps they will grow. Perhaps they will not. Nothing is lost by trying.

In Southern Europe, the pigs are fond of the root of Shooting Star. They dig it up and gobble it down greedily. So, in those countries, the common name of this lovely flower is "Sow-Bread." Not a pretty name, is it? What do you call the flower? Some children call it "Mosquito Bill" and some "Roosters." Both these names come from the shape of the pistil. I have heard that some call it "Mad Violet," though why I do not understand. It does not look like a violet nor does it seem at all angry. It never acts wildly, but just grows quietly, crouched near the ground.

I like best the commonest name, "Shooting Star." That gives the thought that the flowers' loveliness is not all of the earth. They have some of the calm beautiful spirit of the Stars. People who watch the Stars lead lovelier lives than those who

watch only the head lights of automobiles. The Stars make us quieter. They teach us not to rush. They teach us it is better to take time and do our work well.

Let's watch the Stars.

XV

TRILLIUM

One, two, three,
One, two, three,
Trillium, Trillium,
One, two, three.

One of our first flowers to come out in the Spring is the Trillium or Wake-Robin. It was called the Wake-Robin in the East because soon after it blossoms there, the robin begins to sing. That is a topsy-turvy idea, is it not? The pretty flower is the alarm clock to call Robin to sing, instead of Robin being the alarm clock to awaken the flower.

In California, we usually call it Trillium. That is the name Botanists gave it long ago. It is easy to see why. It means that its parts are in "threes."

You can easily see it for yourself. There are three green leaves at a top of a stem. From their center rises the flower stalk. There are three green sepals and three light petals. There are six stamens. The three stigmas curve back as the petals do. You see "Trillium" is a very good name for it. You can call it Wake-Robin if you like that name better. It is really a pretty name and sounds like Spring time.



FIG. 15.—Trillium. (*Photographed by A. J. Soares.*)

Wake-Robin does not come out in the sunny places as does Buttercup. She likes best the slopes near a creek, where there are always bushes to give her shade. Do you think she wishes insects to help her?

Look at the three green leaves. See how they round in to the center where they join the stalk. Notice the five deep lines all running down to that center. These deep lines in the leaf are called "nerves."

If Mrs. Insect happens to land on one of these curves, she will walk on the nerve right down to the center. When she gets there, she will see the flower standing up higher. All insects are curious, just as boys and girls are. If they were not curious, they would never learn anything new. So, this insect will crawl up the stalk to look into that flower.

The three sepals spread out and the three petals stand up. Between them there is a little space. This is an easy open door for Mrs. Insect to crawl through, if she has come from below.

If Mrs. Insect comes through the air and alights on a petal, she finds little paths leading downward. Of course, she follows one and when she is down low, she is sure to strike the bottom of the stamen. The anther opens and the pollen falls over her. The anthers are full of a very rich pollen. Many insects like to visit Wake-Robin just to eat the pollen and to carry it home. They go to several flowers as they collect. The stigmas take the

pollen that is on their bodies and send it to the ovules.

After her seed is formed, Wake-Robin changes her dress to a darker one. That is a sign to the insects that her pollen is all gone. They will be wasting their time if they come to her. No insect ever has any time to waste. You have watched them, have you not? They hurry along always with their minds set on just what they are doing. If you put a piece of grass in their way, they just walk around it and go to their business. So, when they see that Wake-Robin wears a dark gown, they leave her alone.

If you dig down under the stem, you will find a thick root. If you leave this alone, the Wake-Robin will rise up again next year. If you are fond of Wake-Robin, you can dig up the root carefully and put it in a paper with some of its own earth around it. Then plant it in a shady spot in your garden. Next year you will have a Wake-Robin as good as the ones that bloom in the woods. If you leave the root in the ground unharmed for several years, you will have a bed of Wake-Robins.

If you want a beautiful wild flower garden in the Spring, get some roots of Wake-Robin's tall sister, whom we always call Trillium. She is so beautiful that many people in the East and in Europe have her in their gardens. Isn't it funny? We send to Europe for roots of the Tulip for our gardens and do not notice the Trillium growing

" in the next field. Europe sends to us for roots of our Trillium and other wild flowers. They use Tulips, too, but they prize highly some of our Native flowers.

This Trillium is very handsome. Her petals are long and waxy. They are wonderful colors—white and cream; from palest pink through to darkest red; from lemon color to orange; from sand color to dark brown.

Her green leaves are wonderful too. They are sprinkled with dark spots, of all sorts of shapes. Some look like strange writings. If you can read the Fairies' alphabet, perhaps you will find a letter just for you on the Trillium leaf.

This Trillium sends out a message to the insects. It is not so sweet as that of Wall Flower, nor as strong. It smells like lemon juice mixed with strange spices. The insects fall in love with the fragrance and come rushing to find out what it is. Then they find the pollen. As they feast upon it, they also help Mrs. Trillium by carrying some of it to her neighboring blossom. Then good seed is formed and sent out to form new plants.

Underground, the roots are also forming new plants. We call these kind of roots "Bulbs." You have seen the bulb of the Chinese Lily which your Mother started in a bowl of water. You saw the tiny roots go out in the water and the stem with leaves and flowers rise up. That is the way all bulbs act. Some of our most beautiful wild flowers come from bulbs. Some gardeners make a

business of collecting them and shipping them all over the World.

Some of you boys and girls might plan right now to go into the California Bulb business when you are grown up. Ask your Mother how much she paid for those Tulip bulbs last year. There is good money in raising bulbs for the market. There is pleasure in it too. The work is out of doors. You learn about the soil, the sun, and the shade each plant wants to make it healthy. You learn which insects are its friends and which insects are its foes. You find out something interesting every day.

If you don't wish to be a "Doctor, Lawyer, Indian Chief," just think of making a business of our native plants. Think of the seeds and bulbs you can sell. "John Brown, Grower of California Wild Flowers." Wouldn't that make a fine sign over a store?

Many seeds! Many sales!

XVI

IRIS

Glorious child of Sun and Rain,
Rising brave and beautiful
When they command, tho' wild winds strain—
Teach me to be dutiful.

One of the early Spring flowers that is an old friend of yours is the Iris. Perhaps you call her the "Flag," but as Iris, she is known to all the World.

Do you know why? Did you ever hear anything else called "Iris"?

Yes, Benjamin. You have heard something else called "Iris." What is it?

"The iris of your eye."

Why, that is good Benjamin, although it is not what I was thinking of. What is the iris of your eye?

"The colored part."

Yes, it is the iris that is blue in your eye, Benjamin. The iris in yours, Howard, is brown. In your eye, Anna, the iris is grey. The iris is always colored, but it is not always the same color. The word "Iris" always makes us think of color. Let us see if you can find out what "Iris" I was thinking of. After a rain, did you ever see bright colors in the sky?



FIG. 16.—Iris. (*Photographed by A. J. Soares.*)

Yes, of course you did. "A rainbow," you say. That is what I was thinking of. "Iris" is only another name for rainbow.

If you look at the beautiful Iris blossom, you will see that it shines with every color of the rainbow. Its name brings back a story our people have known since the beginning of time.

The story goes something like this: "Once, when the World was young, there was a long, long rain. For days and nights, and days and nights, it rained. Never did the sun come out. The birds and the bugs and the beasts all shivered and hid themselves. They tried to keep dry and warm. The plant seeds all cuddled under ground. No plant wanted to start growing up into that wet World. Their leaves and stems would be beaten down before they could send out their beautiful flowers.

One plant grew weary of the dark underground. She sent up some straight pointed leaves. When the rain hit them, it simply rolled down to the ground and did not hurt them. Then she sent up a pointed flowerbud, wrapped in thin green leaves. The raindrops that struck this green bundle tumbled head over heels down to the earth. No rain got inside the green wrapping to hurt the flower.

Suddenly out came the Sun, more brilliant than ever for having been so long hidden by the clouds. Some of its rays played hide and seek with the raindrops. Together they made a beautiful colored arch across the sky.

The flower bud near the ground felt the warmth of the Sun. It hurried to throw off the green wrapping. It opened itself to the sky. There, just above it was the arch of the beautiful rainbow. The flower stopped growing. It just gazed in admiration. The lovely colors were impressed upon its heart, and to this very day it still shows them.

So when people were naming the flowers, they said, 'This beautiful flower has all the colors of Iris. We shall call her 'Iris' and she will brighten our earth just as Iris brightens the heavens.'"

Is it not a pretty story? You know if we look at a beautiful thing, our face will shine with the thought of beauty. That is why it is a good thing for us to look at flowers and sunsets and pictures. The more beauty we admire the more beauty will be in our thoughts.

Iris to-day has the same way of growing that she had a long, long time ago. You have seen her dark leaves come up during the early rains. If you live near San Francisco, you see her leaves making little dark green islands in the sea of pale grass that covers those hills. You know what "islands" are, do you not?

Look at the Iris leaf. It is shaped like a sword. It is long and narrow and comes to a point. It cuts its way through the ground. It is smooth and stands up straight. All the veins run up and down. Any rain drops that fall on it find nothing

to hold on to, as they do on a geranium leaf. They just slip right down to the ground as if the leaf were a toboggan slide.

They have to fall outside the plant too. See how the Iris leaves fold over each other and then over the stem. It would take a strong raindrop indeed to force its way between them and to get to the flower stalk.

Take a leaf off the stem and see its light lining. Is it not like the finest oiled silk? Finer than any oiled paper your Mother takes to wrap your lunch in.

Look at the green covering of the flower bud. See, it is lined with this same white oiled silk, of an even finer grade. Notice that one of these green overcoats is around the flower stalk where it leaves the stem and a thinner overcoat is around each flower bud. Iris is taking no chances of letting wet in to harm her seed-making parts.

Try to pull up some leaves. Can you do it? Iris makes her parts strong so that the cold of winter cannot hurt them. If you dig down, you will find the root a good storehouse of food for young plants. You can transplant it to your own garden. Perhaps you have some of its cultivated sisters there now.

Take a flower stalk between your fingers. Run your fingers around it. How smooth it feels. There is not the tiniest angle to it. Nor any channel. Nor any hairs. Feel how it turns in your fingers. It can turn any way without break-

ing. Just after dawn, it bows "Good Morning" to the newly risen Sun in the East. In the evening it bows "Good Night" to old Father Sol in the West. What pretty manners!

Let's copy it. Let's bow, "Good Morning!"
"Good Night!"

XVII

IRIS, AGAIN

Glorious child of Rain and Sun,
Working, tho' illustrious,
Until your seeds new fields have won—
Would I were industrious.

Take an Iris blossom. Just look at it a while before you think of its parts. How rich its coloring is. See how it shines as if some diamond dust was worked into its material. How graceful is its form. You see the flower does not grow in straight and narrow lines as its leaves do. It copies the curves of the Iris in the sky, just as it copies her lovely colors.

Now look at Iris closely. You count nine bright parts. Each looks like a petal. There is no sign of a green calyx such as Baby-Blue-Eyes wears all her life and Poppy pushes off when she greets the sun. There does not seem to be any stamens. There does not seem to be any pistil.

Why, what an odd flower Iris is! She has caught the curves and the colors of the rainbow and has brought them down to earth. Have they given her some magic power? We know that there is "a pot of fairy gold" hidden in the ground at the rainbow's end. Can it be that Iris has a fairy wand? Can she just wave about and form her seeds with petals alone? A glance at the



FIG. 17.—Little Iris. (*Photographed by A. J. Soares.*)

lovely flower makes you ready to believe that that is true. Nothing but petals in sight.

However, you children know by this time that petals can not make seeds. No matter how beautiful they are, their work is not the real seed-making. You know it takes stamens and pistils to make seeds. You have seen that Iris does make a strong seed-case, so now look carefully at her parts.

I must tell you that sometimes a calyx is not green. If a flower loves other colors, it sometimes dyes its calyx different. But the calyx is always the outside ring of the flower parts.

Those three large parts of the Iris form the outside ring. They are the sepals. They are the most beautifully colored. They curve back gracefully. They have lovely gold and purple lines on them.

The next three parts are the petals. They are the ones that stand up straight inside the calyx and then curve inward toward the center. You see they are not so beautifully marked as are the sepals. They do not need to be, as the sepals do their work.

The three inner parts that curve first outward and then toward the center are the three stigmas of the pistil. Just compare them with the two little round black stigmas that Baby-Blue-Eyes carries. They are so much more beautiful that we mistook them for petals. See how each stigma divides into two parts at the top, just before it takes the inward curve.

Look at the outside of the stigma. Just below where it divides you see a little light-colored shelf.

When you have found that shelf, you have found the stamen.

My! You give a sigh of relief, don't you? It did seem that the stamens were missing. You expected to find them standing up just inside the corolla. You see they are really in a ring outside the pistil. They are joined to the bottom of the sepals. The stigma curves over like a nice roof, so that the stamen just curves itself along the stigma's back. The anther is turned to the outside so that it can throw the pollen outward.

The sepal has all those gay paths to lead down to the little dishes of honey at its base. You can see how the honey is kept safe from the rain.

Mrs. Big Ant lands on a sepal. She knows that such gay paths must lead to a fine party. She rushes down the nearest one. As she passes the shelf of the stigma, she knocks against it. If she is visiting Iris for the first time, nothing happens there.

When she reaches the honey bowl, its contents are so good that she forgets her table manners. She grabs hold of the dish and fairly gobbles down the contents. Fie, Fie, Mrs. Big Ant! That is a rude way to eat.

But in eating so rudely, she helps Iris. She shakes the stamen that rises up from the sepal on which she is standing. Pop! The anther opens at each side and lets fall a shower of light-colored pollen. The anther is so large that you can open one yourself, if you wish to see how it

works. Try tickling the base of the sepal with a stiff blade of grass.

When Mrs. Big Ant enters the next Iris, she is not in quite such a rush. She strolls along a honey path. But her head and her back knocks against the shelf of the stigma and now she has something to leave on it. That sticky underside of the stigma's shelf brushes up the dust off Big Ant's body quicker than you can wink an eye. Then, the stigma sends the pollen down to the seed-case where the ovules are waiting to be made into seeds. If you take a flower to pieces carefully, you will see that the stigmas rise up from the seed-case below.

Mrs. Big Ant is not interested in the pollen or seed-making. She shakes herself free from the sticky stigma and goes down to the dish of honey. Let us hope she eats more tidily now. She cannot be so hungry as when she entered the first Iris. No matter how gently she sips, she is sure to shake the stamen. Then she will receive the shower of pollen and carry it to the next Iris.

You can see that a small insect can pass in between the sepals and dine without ever touching a stamen. That is why Iris makes so much pollen. She can feed many guests. If some are mere robbers and will take their food without paying for it, it does not worry her. She just keeps on being beautiful and generous. In time, some large honest bugs are sure to come along,

and she is well repaid for setting the delicate table.

Do you think Iris can make seeds if the insects do not help her?

Iris does not bloom as long as does Buttercup. She is willing to pass quickly, just as does the Iris of the sky. As soon as her stigma has received pollen, she curls up her beautiful parts. Then all her strength goes to her seed-case and its contents.

Look at the seed-case. It is an easy one to study. How many corners has it? Is it the same width along all its length? Cut one across. See the three cells running from bottom to top. See how there are two sets of little flat seeds extending up and down in each cell. Have you noticed what the seed-case does when the seeds are ripe?

You will always find a pleasure in studying the Iris. Every part is interesting, her store-house roots, her sword-like leaves, her lovely blossoms. People always have loved her. France has her for its National Flower, just as we in California have the California Poppy for our State Flower.

Artists have loved to draw designs from its flower, its leaf, its seed-case. Ask your Mother if she has a tablecloth with a design made from the Iris on it. Ask her if she has a "*Fleur de Lis*" tablecloth. That is the French word for "Iris." When we go in a store to buy a tablecloth, we

do not say, "Please show me an Iris pattern." We say "Please show me a *Fleur de Lis* pattern."

The *Fleur de Lis* is all around you. Look at the corner of your handkerchief. Look at Eleanor's silver pin. Look at Lloyd's necktie.

Draw some yourself. Copy some of these designs the artists have made for us. Then, take a stalk of our California Iris. Draw the leaf. That's easy. Make all the veins go the same way. Draw a bud. That's easy. Now, draw a seed-case whole. That's easy. Cut a seed-case across and draw the three cells and the little seeds. That's easy, too. Now, draw a flower. That's not so easy, is it?

But keep looking at it and keep drawing what you see. It will not look like a rose, will it? It will not look like a daisy. It will not look like any flower but the Iris. So keep on looking closely and keep on drawing what you see and some day you will make a perfect Iris. Then, you will be a good artist.

Good Eye! Trained Hand!

XVIII

BLUE-EYED GRASS

“Ride a Cock-Horse,”
Our heads held high,
Running our course
Till our seeds fly.

Iris has a little sister whom you all know. At first glance, you might not think she was of the same family. As you grow in years and in the study of plants, you will see that she is.

Out on sunny slopes early in the year, you often see masses of blue stars dotting the grass tops. “Blue-Eyed Grass” we call these plants because their leaves seem so grass-like.

Now that Iris has taught you that a calyx need not be green, you can easily pick out the parts of Blue-Eyed Grass. She has not such a graceful form as Iris, and has different shaped sepals, petals, stamens, and stigmas. Indeed, she seems to like a simple form. She makes her calyx and corolla nearly exactly alike.

You see six blue or purple rays going out from the center, all looking alike. They all look like petals. Three are really sepals.

Mrs. Blue-Eyed Grass sometimes makes the sepals a little wider than the petals, but not much. She always spreads out the six parts the same



FIG. 18.—Blue-Eyed Grass. (*Photographed by A. J. Soasre.*)

distance. Then she adds a point or so to their edges as if she wanted them to stretch out still farther. She puts the same yellow dash down their center. She gives them the same kind of honey paths.

She arranges her stamens in full view. Your heart does not sink for fear they are not there, as it did when you looked for the stamens in Iris. However, Mrs. Blue-Eyed Grass wanted a little change from the usual stamens. She broadened out her stems and joined them into a little tube. The three small anthers are hung on top of this tube.

The pistil comes up through the stamen tube. It stands up in plain sight. Its knobby stigma does not look anything like the beautiful one of the Iris.

You can easily see how Blue-Eyed Grass gets help in her seed-making. Little Miss Ant crawls up the grass-like stem until she lands on a flower. A sepal or a petal seems a broad platform to her after her climb up the narrow roadway. She does not stop to look at the view. Her nose tells her something good is in the pantry. The yellow center tells her eye where that pantry is. Down the honey path she goes. O, joy! Her nose and her eye have led her aright.

The pantry is narrow, even for little Miss Ant. Though she be very orderly in her dining, she is sure to touch the stamen tube. Then, you know what happens.

Yes. The anthers open and pour the pollen over her. Then, she goes out to find another Blue-Eyed Grass pantry. In getting to it, she brushes against the knobby stigma and leaves the pollen on it.

When the stigma receives the pollen and sends it down to the seed-case, it rolls back into three parts. That shows it does not care to use any more pollen. As the seeds ripen, the sepals and petals curl themselves up into funny shapes. Then, many children call them "Nigger Babies."

The seed-case is not like that of the Iris, nor are the seeds the shape of the Iris seeds. Look at them for yourself.

When you notice the leaves, you see that they grow as the Iris leaves do. They fold over each other and over the stem. I wonder if you would like to know what Botanists call this kind of leaf growth. I think it is not too hard a word for you. Its meaning always makes me smile. They say these leaves are "equitant." That means "leaves riding astraddle," as you ride a horse. Did you ever ride a horse? If not a real live horse, you must have ridden a rocking-horse. At any rate, you have ridden a broom handle. You just put one leg on one side and one on the other, and off you go. That is riding astraddle. You see Blue-Eyed Grass leaves and Iris leaves ride the stem this way, and so they are "equitant leaves." Look in your home garden and see what other plants have their leaves riding horse back.

In the Spanish California days, Pablo and Inez used to make a purple ink out of Blue-Eyed Grass. They called it a pet name that meant "little letters." In those days, it was not easy to get pens and inks. There were very few stores in the state. The children lived on ranches far from the stores. Think of the joy of finding in your own home field a little plant that would give you a fine violet ink.

Inez would beg her Mama for some of the paper that the last sailing vessel had brought from Boston. Pablo would whittle off the end of two feathers. Then, they would write a letter to their cousins, Miguel and Elena, who lived at Santa Clara. Very carefully they wrote. Very, very carefully. It did not count that a whole field of ink did grow one jump over the fence. The paper took months to come in a sailing vessel. They could have very little of it.

And what do you think? Miguel and Elena wrote back to them in the same kind of violet ink.

If you, Paul and Agnes, Michael and Ellen, want a still stronger ink, take Blue-Eyed Grass's pretty sister, "Golden-Eyed Grass." Her stain is even deeper purple. As you study her, you see that she is very much like Blue-Eyed Grass. Some people think her golden star prettier than the blue one.

You might take the juice of Blue-Eyed Grass and that of Golden-Eyed Grass and see which ink you prefer.

Write carefully! Don't soil your clothes!

XIX

FRITILLARIA

We ring, we ring, "Here comes dear Spring.
Awake ye nymphs and fays,
Your webs and paints and brushes swing—
Come, Larks, strike up your lays."

How many of you children know the Fritillaria or Checkered Lily? It is sometimes called the Mission Bells and sometimes the Rice Root. All its names fit it well.

It looks quite different from the bright colored flowers we have been studying. Does it not? Perhaps you wonder if so dull a dress will attract insects. Just kneel down by a Fritillaria for a few minutes. See, she has many visitors. When you study her, it is easy to tell why.

After becoming acquainted with Blue-Eyed Grass, you know that, in some flowers, the calyx and the corolla look alike. This is true in Fritillaria. You see a beautifully shaped bell. It has six parts, all colored alike. You will find that three are joined to the stem a little farther out than the others. These are the sepals.

Both sepals and petals are woven of a thick material, quite different from Poppy's thin satin. Fritillaria seems to use this thick material so that she can drape each part into graceful curves. She



FIG. 19.—Fritillaria. (*Photographed by A. J. Soares.*)

just dotes on curves. She does not even hang her leaves in straight lines.

As for her sepals and petals, she compounds her curves in them. Each part is arched along its long line. It curves its sides toward the center. Its edges are wavy all around. You see *Fritillaria* is an artist when it comes to lines.

She does not seem to care for color. She gives her head a toss, and exclaims, "No copying of Sun and Sky for me! The colors of Mother Earth and her soft Grass are good enough for my gown."

But really, she does take care in arranging her browns and greens. She mixes them together in checks and in spots. Sometimes, she adds purple to her dye. Sometimes, she bleaches them out to palest green. I really believe, Mrs. *Fritillaria*, that you spend as much strength in getting your dress perfect, as *Baby-Blue-Eyes* does in copying the Sky and Clouds, or *Poppy* in copying the glorious Sun.

Down at the bottom of the bell, *Fritillaria* puts an oblong shaped dish of sweets. It lies open for any one to see. Its fragrance floats far on the sunny air. You may be sure that Mrs. Ant is not slow to accept the kind invitation the Breezes carry to her.

Inside the bell are the six stamens, each with an oblong anther on top. The pistil rises inside their ring. Its stigma is divided into three parts, each of which curves gracefully outward.

Even if you happen on *Fritillaria* when she has not visitors, you know how they help her. As they

feed at the oblong honey dish, they stumble against the stamens. The oblong anthers open, and down falls the pollen.

When the visitors go into the next *Fritillaria*, they carry this pollen with them. It is dusted off on to the stigma and is sent down to make the ovules into seeds.

Fritillaria makes her seed-case along beautiful lines. She curves it in and wings it out. She packs in it six rows of thin flat seeds. Watch it as it grows old. See how its material changes. See how it gets its seeds scattered.

When you are older, you can study the different kinds of leaves *Fritillaria* has. You can tell the age of the plant by its leaves. Some people, you know, can tell a horse's age by its teeth. Well, one who has studied the *Fritillaria* can tell by looking at the leaves, just how long ago it was that that plant was a tiny seed. There are many things you can learn about plants as you grow older. You cannot learn everything the first year you study them.

Now, you need only notice that there are different kinds of leaves on the same flower stalk. Notice that they are fixed differently on the stem. See what a deep green the stem is and how it wears a soft powder over its color.

When you hear *Fritillaria* called "Rice Root," you know she must be making something odd underground. She is. If you dig up a root, you will find many little bulbs around it, shining

white like rice. Be careful not to hurt any of them. They will all grow into beautiful plants if left unharmed. You can transplant some roots and start a *Fritillaria* bed of your own in a shady spot.

The Spanish Californian children called *Fritillaria* "Mission Bells." You can easily see why. Her brown blossoms are as beautiful as the bronze bells that were brought from Spain and hung in the Mission's belfry. They were rung to call people to church or on news of gladness or on news of sadness. The ringing of the Mission Bells always meant that people would come together to think about the same thing. Perhaps when the Fairies want to call their people together, for gladness or for sadness, they sound a chime of *Fritillaria*.

There is an old story of why the *Fritillaria* is dark and why she has such great big drops of syrup in her cup. It runs this way:

"Before Christ was crucified, the *Fritillaria* was pure white and held her flowers open up to the sky. While Christ was hanging on the Cross, all the flowers hung their heads and wept. All but *Fritillaria*. She stood proud and straight. When Christ died, a darkness passed over the earth. Then, *Fritillaria* suddenly became sorry for her pride. She hung down her bells. She changed her white dress to dark mourning. She shed tears of sorrow. She has not stopped being sorry yet. You can see for yourself the down-turned bells, the dark dress, and the ever-present tears."

This story is not true, but it teaches us some things we should learn. We must never be too proud to show sorrow for any one's sufferings. Then, we will never have to shed tears because we had been proud.

Dry eyes to you.

XX

SOAP ROOT

Unspotted blossom,
A-sway in the heat,
Thanks for the Castile
That lies at your feet.

The flowers we have been studying open their hearts to the sun in the morning. Most flowers do that. They love the early sunshine. However, there are some flowers that seem to hate to get up in the morning, just as some little boys and girls do. Not *you*, of course.

Do you all know the California Soap Root? If you have camped out in your summer vacation, perhaps you have used the root to clean the grime off your hands. You like it because it makes those soft suds that make your hands feel nice. Perhaps that is just why the plant does not like moisture. Perhaps it is afraid that if it touches much water it will melt into soapsuds and float away in rainbow bubbles for the Fairies.

At any rate, you do not find its flowers in the Spring when the air may be damp. The long green leaves are out, spread on warm rocky hill-sides. They have little earth to draw moisture from, but they grow longer all the time. The flower does not bloom until summer. Even in that



FIG. 20.—Soap Root. (*Photographed by A. J. Soares.*)

warm season, it does not open until in the afternoon. Then the air is sure to be well heated.

The Soap Root has six regular floral parts like *Fritillaria* but they are different from hers in shape and in color. Botanists say they are "tongue shaped." Does not that describe them well? They are long and narrow. They end in a roundish point. Their sides curve in. I really do not like little girls and boys who stick out their tongues. It is not nice to do so. But I think you might stick your tongue out just *once* to see how much like it Soap Root's petal is shaped. Don't get the habit. After all, your red moist tongue is not pretty as is Soap Root's white waxen sepal.

Because she comes out in warm weather, Soap Root does not need an overcoat on her flower buds, as *Iris* does. She sends up many buds along the main stem and along branch stems. They spread out wide into six white waxy parts, with a purple line down the middle. While the sides of the floral parts curve inward, the tips curve backward from the center.

The six stamens rise up tall and then bend toward the outside. The dark anthers swing loosely on their tops.

The pistil comes up in the center of the stamen ring. The little stigma knob at its top divides into three lobes.

Just as some flowers open in the late afternoon, some insects come out then to feed. Mrs. White Moth sleeps in the early half of the day and comes

out late looking for a meal. She becomes almost discouraged. Flower after flower she finds closed. Can she find no meal? And she so hungry? Her wings begin to droop.

Suddenly up she tosses her head. What are those white waxy stars waving in the lower air. Stars should be higher up. She fairly flings herself through the air to reach them. Aha! Food! And a very good food at that. She gains new strength and courage. She goes from blossom to blossom, and you know what happens.

Tell us about it, Marion. Is that right, Ted? Yes, it is. You children are learning a lot about flowers and their habits. Is it not fun? There is always something new that you had not noticed before.

When you learn "2 and 2 are 4," you *know* that, and that's all there is about it. It always was true and always will be true. You just learn it and remember it. There is nothing about it to make you curious. You have no more interest in it.

But a growing plant, now, *that's* different. Each day you see something new to you, in leaves or stem or flower or visitors. You can be interested all your life, no matter how long you live.

A great Botanist, Sir Joseph Hooker, lived to be over ninety years, and he said he was learning something new each day when he was that old. When he was ninety years old, all the countries of the World sent noted Botanists to be at his Birthday party. We had one Botanist there from

California, and you just ought to hear what a fine party it was. Such fine talking and thinking about *living, growing* things. Oh yes, they had something good to *eat* too. You always do have something good to eat at parties. But it is more fun when you also have something good to *think*.

But to get back to Soap Root. When her seed-case ripens, she does not cast off her sepals and petals. She dries them into purple and twists them over the seed-case. The seed-case is shaped something like a top. See if it spins to send its little round seeds out.

We can easily see what gives Soap Root its common name. The root has been used by all the peoples who have lived in California. The Indians washed themselves with suds made from it. They also used it in a way that our Law to-day will not let us. The squaws knelt down by a pool and made it all white with Soap Root suds. The fish did not like that mixture, so they floated on the top as if half asleep. Then, the squaws caught them in their hands and filled many baskets with them. What they did not wish to eat fresh, they hung on the bushes to dry. Then, they had dried fish when none were to be caught.

The Spanish Californians used the Soap Root for washing their clothes. Washing Day was not disliked in their time. It was really a sort of picnic. Baskets of soiled clothes were carried down to the creek bank. Camp fires were made under large copper tubs which were filled with the creek water.

The clothes were soaked in the creek water and well rubbed with Soap Root. Then they were boiled in these copper tubs in Soap Root suds. Then, they were rinsed in the clear creek water many times. Then, they were spread out on the grass. The fresh air and bright sunshine finished the work the Soap Root and the creek water began. How white those clothes were and how sweet they smelled! No Steam Laundry to-day brings us back such clean clothes as the open-air laundry on the creek bank returned to the Spanish Californians.

I said Washing Day was like a picnic. It was. The washers ate their *carne* and *tortillas* by the stream. In those days, people travelled mostly on horseback. There were few roads between Northern California and Southern California. People rode on trails. Most trails followed along the creeks. So, the washers often saw a horseman coming from a distant part of the State before he got to the ranch or to the town.

They would hail him. He always stopped to talk with them. Sometimes he lingered to eat with them. He used to tell them all the news of the place from which he came. The washers used to know the news before the other people did. So, when the Americans came to the country and the General wanted to learn the latest news from Los Angeles, he sent his scout to the washing pool. They used to call this way of getting the news "The Washerwoman's Mail."

When the Forty-Niners were digging gold in the Mountains, they were very glad to have Soap Root to wash themselves and their clothes. Soap was not so common in those days as it is with us. And besides, it would be heavy to pack the miles into the mining country. So, they looked on Soap Root as one of their friends who made their lives easier.

If you want to have fine glossy hair, use the root as the Spanish Californians did. Make a good suds of the root and rub it well into your scalp. Then, rinse the suds out in several waters and dry your hair in the sunshine.

If you wish to play shampoo-ing, just use it. All your customers will find their hair so much improved that they will come back for another shampoo. You will have a crowd waiting for seats.

Slippery suds! Silken tresses!

XXI

AZALEA

Can it be true you are a fraud?
That your fair gown's a luring snare?
Such dismal rumors are abroad,
O, Blossom Dear, beware, beware.

All the flowers you have been studying bloom out near the ground; but you know that there are flowers on bushes above your heads. One of the loveliest flowers you see on your summer vacation comes out on a bush. Sometimes its flowers are low enough for you to reach; sometimes they are higher than a giant's stretch. This is the Azalea.

You see her lovely bushes along the streams. At the end of the branches are crowded many large flowers. Some are white with markings of pink or of yellow, and others are pink.

The Azalea has a simple calyx cut into five sepals. Her corolla, too, is of five parts, but she has joined the lower parts of the petals together. No bug can creep in at the bottom. He has to enter at the top if he wants to taste her honey.

Azalea grows very long stamens that reach quite outside the corolla. The pistil comes from the center and reaches still further out than the stamens. Tiny bugs could crawl into Azalea's heart without getting pollen upon them.



FIG. 21.—Azalea. (*Photographed by A. J. Soares.*)

But if a butterfly or a humming-bird dips its tongue in, it will surely hit the loose hanging anthers and be powdered with the pollen. Then, when it goes to the next Azalea, it will first touch the top of the pistil and leave there the pollen.

When the pollen gets to the ovules, the seeds begin to grow. You would expect large seeds from so large a plant. But no. The Azalea seems to want to get many new plants started. So she packs her seed-case full of tiny seeds, many, many of them. She makes the seed-case hard and woody, so that they will be well taken care of until they are ready to grow in a new place. Look at it. How do the seeds get out?

The Azalea does not send out her blossoms until the bush is well covered with leaves. Then she groups the flowers at the end of the branches. They can well be seen by any flying creature. They are hidden from the ground by the leaves. Any one coming up from the ground has a long hard journey through her forest of leaves. That is why Azalea grows this way. She does not care for the insects that live at the ground.

Look at a leaf. See how thick it is. How heavy its veins are. See how it curves its edges downward so that all the rain will drop off. Is the lower side the same as the upper?

It is said that the honey of the Azalea is poisonous; that even the honey in a beehive, which the bees have collected from the Azalea is poisonous. I do not know if this is true; but little children

had better leave it alone. It is all right to enjoy the honey of White Forget-Me-Not, but put a red label against that of Azalea.

Even if it is unwise to touch your tongue to Azalea, you can feast your eyes on her beauty. She is a handsome addition to our gardens. Her form is graceful and her leaves glossy. You can bring in a bush from the wilds, or you can buy one at the florist's. It will grow easily and give you much pleasure throughout the year.

If you have one in your garden, watch it to see what insects visit it and how they act. Are they drowsy as they go away? Or are they as lively as when they came? Perhaps people are not telling the truth about Azalea's honey. Perhaps you can clear her name of this sad tale.

It is a kind deed to say good things about people. It is very kind to tell good things when some one else has said unkind things.

Good words from you! Good words about you!

XXII

JOHNNY-JUMP-UP

Little smiling golden faces—

“How do you do? How do you do?”

Bright’ning shade or wind-swept places—

“Much, much better for seeing you.”

If there is one of our wild flowers that is loved more than another by the boys, I am sure it is Johnny-Jump-Up. Girls love it, too, but some of them have other favorites. Every boy I have ever known, whether his age was seven years or seventy, seems to have a tender spot in his heart for this golden beauty.

Johnny-Jump-Up seems to return this affection. It reaches up above its leaves and smiles sunnily right into our eyes. Then we smile back. That is the way, you know, that smiles travel around the World. Each person who smiles wins other smiles.

Wouldn’t it be fun to start a SOCIETY FOR SMILES. If each boy and each girl now alive would join it, in a few years there would be nothing but smiles on this earth. All the old frowns and the old scowls would be driven off to the Moon. Every one of them would freeze to death up there.

When I was a little girl, we believed that Johnny-Jump-Up knew a lot about friends. We used to make it tell us “which friend loved us best.” We would name two Johnnies for two friends:



FIG. 22.—Johnny-Jump-Up. (*Photographed by A. J. Soares.*)

then lock their heads together, and pull. The head that stayed on was the "friend who loved us best." I hope you children to-day have better ways of proving your friends than pulling off a flower's head. Johnny-Jump-Up is much more interesting with its head on.

The corolla, you see, is like pure gold, very much like the real gold that the miners dig out of our Sierras. Perhaps it takes a great deal of work to make this color, for on the back of the two up-standing petals, Johnny does not use it. It uses instead a rich brown, a color that looks well with the gold around it. The honey paths on the lower petals are a dark purple. Johnny must take much care in getting these colors, for each is very beautiful in itself. Don't you think they look beautiful together?

Johnny-Jump-Up groups the five petals in a way different from that used by Baby-Blue-Eyes or the other flowers we have studied. You have seen the same shape in the pansies in your home garden. Johnny-Jump-Up is a country cousin of your garden pansies and is called "Yellow Pansy" by some people.

Two petals, you see, are standing up, two are stretching out to the sides, and one, deeply marked, spreads out across the bottom.

If you pull out one of the side petals, you will find that the honey paths are only on one half of it. On the other half, a little above where it joins the rest of the flower, is a brush of fine yellow hairs.

Then look again at a whole blossom. You see that the two little brushes on the two side petals form an arch over the pistil and stamens. No dampness can get in under these little brushes to harm the important seed-making parts.

Look at the lower petal of all. See how it curves up just in front of the center, making a little platform. Then, it narrows down behind and makes a little hood. If you pull off this petal, you will find that the hood holds just what Mrs. Bug is seeking.

Inside the petals are five stamens. The anthers stand in a ring, around the pistil. Part of this anther ring shows as you look a whole flower in the face. It is the little red spot above the lowest petal.

Below it, you see a green sticky knob. That is the stigma, the top of the pistil. If you look at the whole pistil, you see it is shaped just like a club. It grows up through the ring of stamens and lays its round green top on that platform of the lowest petal.

Mrs. Bug comes prowling around to find her way into that well of honey. She gets a good footing on the brushes on the side petals. Then she unwinds her long tongue and pushes it under the club of the pistil back into the honey. While she is wiping her tongue to get off every drop of that delicious honey, the anthers open and drop their pollen upon it. When she gets to the next Johnny-Jump-Up, her pollen-covered tongue hits

the stigma laying on the platform. The little stigma very kindly dusts the tongue off clean. Then, Mrs. Bug can enjoy the honey better, and Johnny-Jump-Up's little waiting ovules receive good pollen to make new seed.

The calyx does not fall off when the corolla fades. It holds its five sepals around the growing seed-case. The sepals are not all the same size, but each generally has a little ear-like lobe at its base. What do you suppose that is for?

Johnny-Jump-Up gets this name from the way it springs up above its leaves. You see that each flower has a long stem just to itself. It does not share its stalk as does Buttercup or White-Forget-Me-Not. When you picked a Johnny-Jump-Up, did the stem break off clean like a Poppy stem does? Did you examine it? If not, then look at it now. See the inner cord that seems to be quite separate from the outer covering. Twine this inner cord around, and you will see that it is made up of a number of fibers tied together. That is what makes the stem so strong.

You have all read the story "United We Are Strong." You remember that the Father in the story knew it is harder to break a bundle of sticks than it is to break one single stick. Johnny-Jump-Up, too, knows that if her stem was made of a single material, it would easily be snapped off by wind or animal. So, she weaves a number of fibers together and makes a strong body to hold up her sunny face.

The leaves of Johnny-Jump-Up are carried on the same kind of stems as the flowers. Each leaf, too, has a stem of its own, a stem much longer than the leaf itself is. Do most leaves have stems longer than themselves? Look around your plant friends and find out.

The leaves of Johnny-Jump-Up are pretty to draw. You see they are somewhat heart shaped, and yet you can draw four lines around them. Be sure to make the edge scalloped and put in the big veins running from the outside all to the same point where the leaf sets on the stem.

The flowers and buds are easy to draw, too. Make the outside line first. Then draw in the five petals. Be sure to make the honey paths right, so as to give the flower face a happy look. If you should criss-cross them, Johnny might wear a frown. That would never do. Johnny-Jump-Up always smiles.

Let's smile with him.

XXIII

JOHNNY-JUMP-UP, AGAIN

Little winsome friendly flowers,
"How do you do? How do you do?
Changing gloom to cheerful bowers,
"Much, much better for seeing you."

Not many insects visit Johnny-Jump-Up. Perhaps they find her honey too hard to reach. The few that do call upon her must be fine helpers, for Johnny makes a great deal of seed. Every seed seems a good healthy one. You have seen how the golden beds on the hillside grow larger every year. Do you know how the seeds get scattered?

If you look at the seed-case, you see it is shaped like a long egg. Cut it across. There are in it three rows of seeds arranged down the middle. When those little seeds are ripe and ready to be scattered, what do you think happens? You will have to watch a Johnny-Jump-Up bed to find out. Perhaps if you put some stems bearing ripe seed-cases in a glass of water in a sunny window, they may act in the same way they do outside.

As the seed-case dries, it pinches the seeds. Every sunny hour it pinches them a little harder. Then, it splits open from the top. It spreads out into three parts. Each part looks like a tiny canoe



FIG. 23.—Dog Violet. (*Photographed by A. J. Soares.*)

with a row of balls down the middle. As the bottom of this canoe gets drier and drier, it pinches the seeds harder and harder. Finally, the seeds cannot stand that pinch one moment longer. Out they pop. If you pinch an apple seed between your fingers, you will see how Johnny-Jump-Up's seeds act.

Out they pop, out from the safe home seed-case into the big unknown World. Sometimes they go far; sometimes, near. Perhaps one seed pops out as Old Rover is passing and lands flop on his back. Some day Old Rover will roll on the ground and then that Johnny-Jump-Up seed will find a new home.

Perhaps one seed pops down to the ground just in front of Mrs. Big Black Ant. "H-m-m," she wrinkles up her nose. "That smells just like what we need for dessert to-night."

She catches hold of the little end of the seed and trundles it home. Now, the Big Black Ant Family eat some seeds as we eat cherries. They swallow a little of the outside and throw away the seed germ. So that little Johnny-Jump-Up seed has a good chance to grow in a new spot.

Perhaps another seed pops out as a Strong Wind is passing. Off it sails until Strong Wind stops to get a new breath. Then, it drops down with a bang. Little it cares for bangs, as long as it gets to a bit of good soft earth.

Some seeds have bad luck. They fall on hard ground or perhaps on the State Highway. They can find no soft earth to creep under so they wither

up in the warm sunshine. Others are eaten whole, outside, inside and all, by some starving insect. But even with these losses, Johnny-Jump-Up gets a great number of seeds scattered to start new plants.

Don't you wish we human beings were born knowing just how to live our lives? We have to be taught everything. How to feed ourselves, how to dress ourselves, even how to get around.

This is not so with Young Seed. When she falls on the ground, she lies awhile in the warm sunshine. Then the dew or the fog or the rain makes her seek shelter. She works herself down under the loose earth into a warm nest. Here she lies quiet until the raindrops find her.

"You'd better grow up. You'd better grow up," they whisper. They patter around her, always keeping time to their song, "You'd better grow up. You'd better grow up."

After a while, Johnny-Jump-Up seed thinks she'd better. She is not quite sure she can stand up in that cheerful place the happy raindrops come from. She sends out little roots that will hold her steady, just as we, when we are camping, put ropes to hold our tent steady. These little roots are better than tent ropes. They drink up food from the earth for Johnny-Jump-Up seed. We never expect our tent ropes to bring us food, do we?

Then she sends up a tiny stem to the earth's surface. She thinks she likes that fresh air, so she sends out two pale leaves to try it. They

are all rolled up at first lest the air be cold. The sun's rays warm them and they open wide. The sun encourages them, and the whole plant stretches up into beautiful golden flowers that reflect the sun's glory. Then, they make their seed and the plants life circle is completed.

Even if there was a total loss of seed one year, we would still have some Johnny-Jump-Ups the next. The plant does not die when the flowers and leaves disappear from the top of the ground. The root stock below ground is still alive and strong. It lies resting until the early rains come and coax it to send up new leaves. You will find it a tough root, built in the same way the stem is. You can dig it up carefully and transplant it to your garden.

Johnny-Jump-Up has several sisters also natives of California. I am sure that you know more than one of them. They wear different colored gowns—white, yellow, blue, or purple. They have different markings. They shape their leaves differently. Some choose sunny spots, while others hide in the shade. Not one rises as tall as Johnny-Jump-Up does nor smiles so sunnily. But they all make their corollas the same shape. They all make their seeds in the same way. They all scatter them in the same way. The violets and the pansies in your Mother's garden scatter their seeds in this way. Just watch them.

It is a plant's life work to make good seeds and to get them scattered afar. The plant that knows

how to make the best seed and how to get it farthest off does the best work. Just from watching our fields, we know that our dear friend, Johnny-Jump-Up is a successful worker. She makes me think of a verse we used to have to learn in school when I was a little girl.

“Let us then be up and doing,
With a heart for any fate;
Still achieving, still pursuing,
Learn to labor and to wait.”—*Longfellow*.

Johnny-Jump-Up is surely “up and doing” and she knows how to rest in between times. You never see her frowning, no matter what wind blows.

Let’s follow her. Let’s all “be up and doing.”

XXIV

FAREWELL TO SPRING

Changeable Maiden
With beauty laden,
Dost thou wish to rival thy kin?
Or dost thou praise them
By trying to daze them
With varieties in thy spin?

If any of you boys or girls wish to become a famous Botanist, you better begin now to study the Farewell to Spring.

A Botanist, you know, is a person who has studied plants long and who knows their habits. The famous Botanists of the World have all been men; but that is no reason why a girl should not plan to become one. It used to be that all the Doctors were men. Now, there are women doctors. It does not matter whether you are a man or a woman. It does matter if you do your work well.

So, Helen, if you want to be a Botanist, just start in now and watch the plants. The more you find out about them when you are a child, the easier you will find it to learn more about them later. Plants are like people. If we are friends from childhood, we feel we know them well.

Now, take the Farewell to Spring. It is a native of our Pacific Coast. Most of its family are natives of California. The older Botanists



FIG. 24.—Farewell to Spring. (*Photographed by A. J. Soares.*)

did not have the chance to study it while it was growing. It does not always grow the same.

No matter where the Poppy and the Baby-Blue-Eyes grow, they look the same to us. Perhaps a little smaller if the ground is dry. Perhaps a little larger after a wet winter. But always, they are our same old friends.

Not so, the Farewell to Spring. If the winter has been a dry one, it will bring out one colored flower. If there has been much rain, it will change this color. If it grows on a dry hillside, it differs from where it grows in the shady grass.

The corolla always has four broad petals, but sometimes they are white, sometimes, pink; sometimes a pale purple. Sometimes the edges of the petals are smooth; sometimes, they have little notches; sometimes they are deeply cleft. Sometimes they have a deep crimson spot down inside near their honey bowls; sometimes, they have a paler red spot; sometimes they have a white spot; sometimes they have no spot. Sometimes on the same plant, there will be differently spotted flowers. They certainly are changeable. But one thing is certain. They never are yellow. And another thing is equally certain. They are always beautiful.

The calyx too acts oddly. It does not open wide when the corolla bursts out and put its sepals around the flower. It just splits on one side and hangs down on the other side below the open corolla. If you take a calyx off, you see it is cone-shaped.

There are eight stamens, but they are not all alike. The four standing opposite the petals are shorter. Those standing between the petals are longer. The anthers are a lovely deep crimson. They add much to the beauty of the flower.

The pistil rises from the center of the stamens. At its top, the stigma divides into four parts and curves them backward as a Lily curves her petals. You can easily see them in the picture.

Mrs. Bug, when she comes visiting, must get a lot of pollen dusted over her. When she goes to the center of the next Farewell to Spring, she will surely brush against the spreading stigma and leave some pollen on it. With such healthy looking anthers and such a fine looking stigma, very good seeds ought to be made. They are.

The seed-case is different from those we have been studying together. It grows long and slender. Lots of seed-cases do that. It gets narrower at both ends. Some other seed-cases do that. It has four sides like a box. Few seed-cases have that shape. See if you can learn how it sends the seeds out to the world.

Farewell to Spring comes in the late Spring or early Summer. That is how it gets its name. Then the ground is dry. Your Mother need not fear that you will get wet feet if you go out to study these flowers.

You will find the leaves differing in shape. Some will be longer and narrower than others. Some

will have a smooth edge. Some will have tiny teeth along the edge.

The stalk of the flower bud will nod over, as if the bud was too heavy for it to hold up. As the sun warms it, the bud bursts open into the beautiful blossom. Then, the stalk stands up straight. It is so proud of the loveliness that it forgets the weight. It sways back and forth, showing off the beauty.

The Butterflies, skimming through the air, see this movement. They stop short.

“Is this one of our sisters?” they whisper softly. “Let us go down and see.”

As softly as snow falling, they descend to the side of Farewell to Spring.

“Oh, it’s a flower. But what a lovely flower! As lovely as any of us.” And that is the best compliment a Butterfly can pay.

“And I smell a dainty meal,” whispers one who had not got up in time to eat breakfast before they left home.

In a second, each Butterfly is inside a Farewell to Spring. And both beautiful insect and beautiful flower nod together in the breeze.

Farewell-to-Spring does not die in one day. It wraps its petals together at night time. Next morning, it opens them wide. The same flower blooms for several days, always closing at sunset.

Every day, the Butterflies visit it. Every day, it has its delicate feast ready for them. Both

beautiful insect and beautiful blossom are helped by the friendship.

It is such a joy to have good helpful friends. Is it not? The way we gain them is to be helpful to them. And to smile and to be just as thoughtful as we can.

Many friends to you!

XXV

WILD CUCUMBER

“I can’t bear a tattery World,”
Cucumber complained with a frown,
Then her vine o’er the tin cans she whirled
And draped the old fence in green gown.

“I can’t bear an old-timey seed-case,”
Cucumber exclaimed in high mirth.
“My babes’ wraps are satin and reed-lace,
But their cradles shock the Old Earth.”

Suppose, Frank, you had no marbles to play with and marble time came around. What would you do?

“Buy some,” you say. But suppose you lived miles away from a store. What would you do then?

“Do without?” Oh, then you would lose lots of fun.

Most of the children in the Spanish Californian days lived on big ranches. They had very few store toys. They had plenty of playthings they found right on the ranch.

When Francisco and Mateo felt marble time in the air, they took out their bags of Wild Cucumber seeds and played the same marble games that you play to-day, Frank and Matthew.

And when Maria and Clara wanted to play jack-stones, they took out their silken bags of Wild



FIG. 25.—Wild Cucumber. (*Photographed by J. A. Soares.*)

Cucumber seeds and played the very same games that you play to-day, Mary and Clara.

You know the Wild Cucumber, do you not? You have seen it climbing over fences and bushes and rocks. What does it do that for? Just because it loves the sunshine. If it lay along the ground, the other plants would grow higher than it and would shut it off from the sun's rays.

The Wild Cucumber will not stand for that. It must have direct sunshine.

It takes some young branches and thrusts them out straight. When they touch a bush or a fence rail, they begin to curl around so as to get a better hold. Just like you. When you are walking with your Father, you do not just touch your hand to his hand. You curl your fingers around his fingers and hold fast.

These curled little branches of plants we call "tendrils." When Mrs. Wild Cucumber gets one set of tendrils around a support, it holds her steady. Then she can grow up higher and out farther. She soon fastens a new set of tendrils around something else strong. She grows up still higher and out still farther. Sometimes, the vine is thirty feet long. How long is that? Try measuring it. Is this schoolroom that long?

By growing so far, Wild Cucumber often covers up old heaps of trash that some careless man has thrown out. Of course, no boy in school would do such an untidy thing. He is learning to be too good an American to spoil the looks of the Country.

Wild Cucumber can do all this beauty work because she can hold herself steady by those little curled branches. If you think the tendrils are as weak as they look, just try to pull a Wild Cucumber loose. You need to be strong yourself, do you not? That shows what living in the sunshine will do for a creature. If Wild Cucumber had not loved sunshine, what would have happened? She would be flat on the ground and every animal would walk upon her.

Besides her tendrils, Mrs. Wild Cucumber has other surprises for you children. You have seen her creamy flowers spread along a little branch held up to the sun. Now after studying so many other flowers, you no doubt think that you know all about these small blossoms.

“They are grouped together,” you say, “and held up high so that they will catch the eye of the passing Bug.”

That sounds all right, let us see if it is true. Did you ever see any Bugs on Wild Cucumber’s flowers? You have not learned all about her flowers yet. They hold a secret. We all love a secret, do we not? Let’s look closer.

“Some corollas have five petals and some have seven.” Yes, that is right, Ethel. But there is more for you to see.

Look down the vine. See that little flower sitting all alone, cuddled close to the stem. Does it look just like the flowers clustered above?

Look at them again. Closely. Pick out the

different parts. You can find the sepals. And the petals. And the stamens, with lots and lots of pollen; but— Why, Goodness me! There is no pistil and no stigma to catch the pollen. However is Mrs. Wild Cucumber going to make her seed? Poor Plant! Poor Plant!

Do not worry about Mrs. Wild Cucumber's seed-making. She knows what she is doing.

Look again at that lonely little flower low down on the stem. You will see below the white petals a little bur and above a sticky knob of a stigma. This stigma is just waiting for pollen from the many flowers above to fall upon it. Then, it will start seed-making.

Mrs. Wild Cucumber does not seem to care for the aid of insects. She makes so much pollen so that the wind can carry it to the little stigma waiting below. If the wind wastes some of it, there will still be plenty to reach the stigma and make seeds. Mrs. Wild Cucumber has learned that if one flower attends to one branch of the seed-making and another flower attends to the other branch, she will get better seeds.

What a wonderful seed-case she makes! Do you think there is much chance of her seeds being harmed? How large and round it is! Prickles all over it! Oh, did they hurt your hand, Edwin? Well, just think how much worse they must have hurt old Bossy's tongue. She will not try to eat them again. That is why Mrs. Wild Cucumber put the prickles on.

Her leaves look tender. Any animal might choose them for breakfast. If he thought the seed-case was like an apple, he might make a bite at it. But one taste of those prickles is enough. No animal is foolish enough to try them a second time. The seed-case is let alone on the vine. In its cozy nest, the seeds grow bigger and bigger.

When the seeds are ripe, the seed-case splits open from the top. It curves the parts back like a Lily curves her petals. It then looks like a lovely white waxen lily. Inside, it has a beautiful lace work which holds the seeds firmly and yet gives them plenty of room in which to grow.

The seeds grow to be beautiful, just as the vine does and the seed-case does. Wild Cucumber seems to be a great lover of beauty. She improves everything she touches. Her seeds are large and handsome, but that does not seem to satisfy her. She gives them an extra beautiful polish, as if she means them for marbles or jack-stones.

However, we know that Wild Cucumber has no thought of children's games when she is polishing up her seeds. She makes these beautiful seeds to start a new strong root. Did your Father ever dig up a Wild Cucumber root? Were you not surprised at what he found? The vine and the leaves look so delicate that one would expect a small root. But not with Mrs. Wild Cucumber. Her course of life seems to be one surprise after another. She wants to grow out early in the year. She has to have a big store house of food. She

needs this not only for her early start, but to give her strength enough to grow out so far. No living thing can do good work without good food.

So she makes an unusually large root. Often, she is called "Big Root." Again, some people call her "Man-in-the-Ground," because her root is sometimes as large as a man's body.

This root starts growing early in the year, whether there has been any rain or not. Wild Cucumber's first green leaves come up when many of the other early flowers are still sleeping. She proves

"Early to bed,
Early to rise,
Makes a 'plant' healthy,
Wealthy and wise."

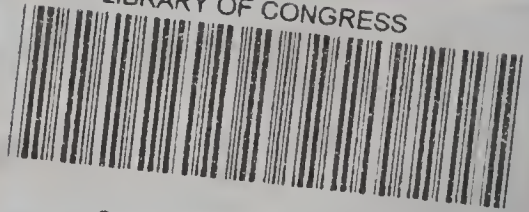
Tell us yourself how she is "wealthy and wise."

She goes steadily about her life work. Every part that she uses in this life work she makes beautiful. That is a fine thing for a child to do, as well as for a plant.

Do steady work. Be so happy doing it that the World is more beautiful for your being in it.

Success to you and your work and its beauty!

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